CROSS-CULTURAL COMMUNICATION ACROSS THE WORLD WIDE WEB: APPLYING PRINCIPLES OF INFORMATION DESIGN TO WEB SITE ANALYSIS OF INTERNATIONAL BUSINESS WEB PRESENCES

by

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GRADUATE COMMITTEE APPROVAL

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This thesis has been read by each member of the following graduate committee and by majority vote has been found to be satisfactory.

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As chair of the candidate's graduate committee, I have read the thesis of Garrett R. Winn in its final form and have found that (1) its format, citations, and bibliographical style are consistent and acceptable and fulfill university and department style requirements; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for submission to the university library.

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ABSTRACT

CROSS-CULTURAL COMMUNICATION ACROSS THE WORLD WIDE WEB:

APPLYING PRINCIPLES OF INFORMATION DESIGN TO

WEB SITE ANALYSIS OF INTERNATIONAL

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Edward Tufte asserts in Envisioning Information that principles of design are "universal 'like mathematics' and not tied to unique features of a particular language or culture". This thesis is an attempt to create a set of web design heuristics that help to bridge cultural gaps by emphasizing universal design principles that focus on the content. I take Tufte's five principles of information design and proceed to apply these rather broad principles to web sites. These principles of design are Micro/Macro – portrayal of lots of information in a small, condensed manner; Layering and Separation – presentation of information that allows page parts to interact; Small Multiples – repetition or juxtaposition of images to allow for comparison; Color – application of color with restraint to label, measure, represent reality, or enliven; and Integration of Text and Graphics – employment of text and graphics to work together to add meaning and readability.

The main goal of this thesis is to share with fellow academia what I learned while attempting to create this set of heuristics and then use those heuristics to analyze web site designs from a few different cultures. I wanted to enlighten contractive rhetoric analysis and to begin to provide the necessary tools in performing that analysis and understanding those communications, as well as bring it and information design closer together in the designer's view. In the end, I hoped to better understand multi-cultural design issues and to determine how Tufte's principles can be applied to web sites while adding data about this important medium to Tufte's work. While this definitely occurred, I came to develop a different set of purposes than I had originally planned.

I came to see the World Wide Web as its own unique, newly formed culture where the presentation of information is essential regardless of the language used or understood by the user (computer translation services help to overcome this barrier). My purpose was to create a fairly broad set of heuristics based on universal, multi-cultural principles to guide a designer toward more cross-cultural designs that focus on content rather than fluff.

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I would like to thank the English Department for their supreme patience and trust that I would actually finish this. I also want to thank Professor Bill Eggington for his dedication and hard work. If I would have listened to him better, I would have realized sooner that 340 pages is a bit too much for a thesis. Of course, I could also never have accomplished this work without the help and encouragement of the rest of my committee: Professors Beverly Zimmerman and Gideon Burton.

Finally, I want to congratulate my wife, Heidi, for making it through a tough 5 years without killing me or tossing the computer in the garbage can. She is my inspiration and my example, and I would have given up a long time ago if she haven't constantly been reminding me of this unfinished business.

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CHAPTER 1. INTRODUCTION

As I complete this thesis in the fall of 2002, the World Wide Web has become mainstream – a way of life in the United States of America. Though not everyone has a computer or access to the Internet, the ideas have reached critical mass. This same trend holds true for many other countries and cultures around the world, as more and more people from around the world come "online" to help make this a truly world-wide web. And, while the Internet initially consisted of mostly personal web sites, businesses around the world have understood the capacity for global outreach that the Internet affords, and have created business web presences of virtual space where customers (potential and otherwise) can go. These web presences are more than just static web sites; they are, in effect, virtual offices or stores that can help their visitors feel that the company is substantial (in a physical sense) and focused on the visitors' needs and wants.

Soon after the web became a personal web page phenomenon, "experts" sprang up that wanted to give some structure and guidance to web page design. Although these experts may not have been the most qualified authorities, they started the discussions around web page design and usability. These discussions later came to include international design standards and audiences, so that, by 2002, the design principles for web pages have started to solidify and to become standardized. However, these standards traditionally split into two areas – (1) "normal" design principles and (2) design for international audiences – instead of being combined into one standard that addresses the needs of both.

In this first chapter, I discuss the following topics:

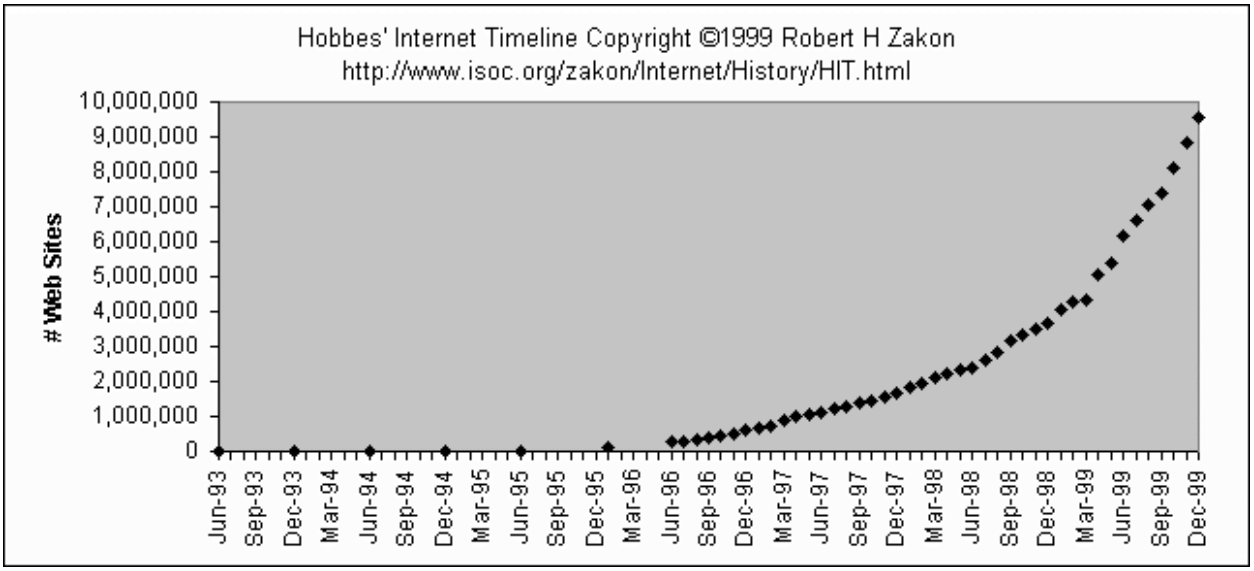
- An abbreviated history of the World Wide Web and web page design, as well as a general overview of why a study of cross-cultural communication is needed at this time.
- The specific scope and topic of this thesis, including a justification and acknowledgement of the assumptions and limitations.
- A statement and description of the purpose of this thesis about how and why Edward Tufte's principles of information design may be applied to web site design.
- A quick overview of what is covered in the rest of the thesis.

General Background

The Internet was first created and used around 1961 to help scientists share their research findings quickly and easily. The rhetorical context of the research pages was mainly informational, with little or no thought given to design or formatting, as evidenced in the small range of markup tags available in the first version of HTML. "Before HTML, the author of the document was never concerned with how the document would appear on someone's monitor. It was accepted that appearance was the province of the user" (Darnell, et al. 18). Since they were all scientists and did not need much coercion to want to learn more about their colleagues' studies, they focused on just providing the text and marking the functions of some specific pieces (like "H1" for a first level heading) rather than describe how something should look.

Over a period of 20+ years, the Internet gradually developed into what is now known as the World Wide Web (or web, for short). By mid-1993, there were 130 sites on the web (for simplicity and to avoid the over-frequent repetition of "web", I use "Internet" and "web" interchangeably throughout this paper although they are in fact two distinct and separate entities); by the beginning of 1994, there were 600; and in 1996 there were well over a quarter of a million sites (Honeycutt, et al. 12; Clark, David 6). By December of 1999, there were over an estimated 9,500,000 web sites (Zakon, see Figure 1). This extraordinary growth of web sites has been due in no small part to the creation of businesses that operate on the Internet and from businesses both in North America and internationally, that wanted to create an Internet presence.

Figure 1. Progression of web site count



These businesses wanted to broaden their audience base and make themselves known to any interested people in the world for less money than they would need for a mail or advertising campaign. Most business owners and marketers quickly learned that putting up a web site was not necessarily less expensive than other campaigns due to the time and cost involved in developing a site that brings people back regularly, a site that provides value, and a site that engenders communication between the company and site visitors (as well as between visitors and other visitors, whether in real-time or asynchronously) by breaking down language and cultural barriers so as to reach the broadest possible audience. Some online businesses simply keep using their web site as a sort of company brochure that is always available and that can reach a broad audience, but that does not allow much, if any, conversation with non-native or even native visitors.

Americans have tended to dominate the web and have, by far, created a majority presence in it. However, other countries are beginning to realize the importance of the web, especially in regard to how it can be used by corporations to create good public relations and to provide information relatively easily and at a low cost. A July 1998 report by PC Magazine indicated that "of the 128 million people around the world with online access, about 40 percent are non-English speakers. This group is the fastest-growing segment of the online population" (PC Magazine 10, see Figure 2).

Figure 2. World Wide Web users

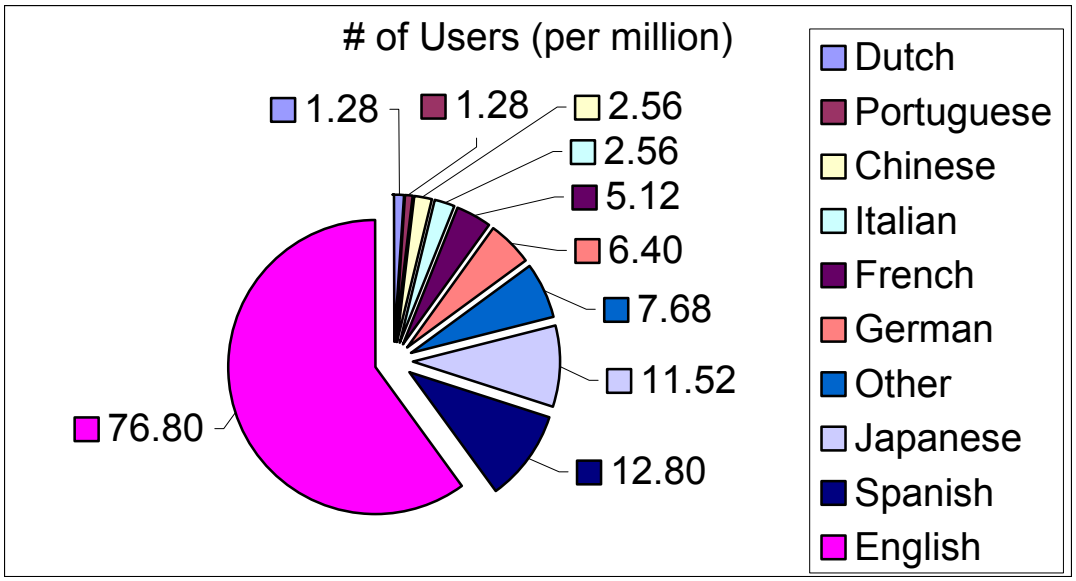


Figure 2 shows that the percentages of Internet users at the time (1998) were as follows: Dutch 1%, Portuguese 1%, Chinese 2%, Italian 2%, French 4%, German 5%, other world cultures not listed 6%, Japanese 9%, Spanish 10%, and English 60%. According to industry reports, in the first quarter of 2000 there were about 192 million Internet users who were online. Of those users, about 50% were natives (or at least residents) of North America. Of the rest, 29% of these were from Europe, 17% from the Asia Pacific region, and 4% were from Latin America. Forecasters predict that more and more Internet users worldwide will be online, so that, by 2003, North American users will only make up about 37% of the online population (Rhoda 1). The growth pattern seems to indicate that the Spanish culture's Internet population has not grown much (it would depend on how much of the North American and European – specifically Spain – percentages include Spanish-speakers), while the Asia Pacific population has grown exponentially.

Although communication on the web has often been an issue with professionals, with the steady influx of users from other cultures, communication between cultures has become increasingly necessary, and knowledge about how to communicate cross-culturally needs to be reevaluated from an online perspective, particularly because of the often asynchronous communicative native of this electronic medium. The results of this evaluation can help inform the body of research relative to contrastive rhetoric and linguistics, as well as web site design standards.

Contrastive rhetoric has traditionally focused on word choice, organization, and style as objects of study. While I consider these – to an extent – in the methodology of this thesis, contrastive rhetoric has not yet accounted for the ubiquitous use of hypertext, color, and graphics on the web as related to the message being sent to the reader. This thesis is an attempt to enlighten this type of analysis and to begin to provide the necessary tools in performing that analysis and understanding those communications.

There are a plethora of web sites and printed books devoted to the promulgation of web site design guidelines. Some seem to have been created because the author found some design or another distracting, annoying, or "sucky" (slang used to mean that something is not good). Few of these resources attempt to provide a single set of heuristics for web designers to evaluate the effectiveness of their design based on universal, multi-cultural principles.

Part of the problem with providing heuristics for design is that some designers attempt to turn the guidelines into a checklist that does not take into account different audiences or creativity in design. By

simply "scoring" a site based on a list of items, you can lose the purpose behind the heuristics. In the case of this thesis, I hope to create a fairly broad set of heuristics that leave plenty of room for creativity and for the "rule breaking" leeway that experts can be given, while still providing sound guidelines for designers to use in evaluating their sites. The heuristics are meant to guide a designer toward more cross-cultural designs that focus on content rather than (what Edward Tufte terms) "chartjunk" that is merely fluff. So, in some aspects, these heuristics are a reaction to the beginning of the change of the hypertext medium from one of information sharing to corporate ad campaigns that give little context or substance.

While there are certainly cases where the "ad" can be effective in the hypertext world, the true communicative power of the medium comes through the content and how it is designed. Therefore, the heuristics developed for this thesis focus less on the presentation and more on how to emphasize the content so it is accessible for the viewer. However, this is not to say that presentation is unimportant or bad. In fact, the presentation must be intricately tied with the content. The problem with many web site designs currently is that they do not tie the presentation with the content (often presentation is seen as everything), and so the sites seem disjoined and inaccessible for even the intended audience culture. Thus, the heuristics developed in this thesis also attempt to provide some direction in tying presentation to content on a very broad basis so as not to hinder creativity and yet not to ignore the importance of the presentative aspects of web design.

Although Tufte's principles have previously been applied to web pages (see Zimmerman 1997), the study did not assess web sites of different cultures (at least not of linguistic cultures), nor did it establish a specific set of heuristics for evaluating the web sites. In fact, the study may have focused too much on the presentation aspects of the pages instead of on how the message or purpose of the sites was presented in relation to Tufte's principles. This is why it generated quite a bit of controversy about which site was better or more effective – because people have different design tastes and the sites were intended for two different audiences.

An informed analysis of many web sites from a few different cultures using basic principles of visual rhetoric will enlighten the body of research (present and forthcoming) in this field; help web page designers in the creation of more-effective texts; and help to create better communication within the linguistic contact zones created by web sites.

Thesis Topic

Edward Tufte asserts in Envisioning Information that principles of design are "universal 'like mathematics' and not tied to unique features of a particular language or culture" (Envisioning 10). By "universal" I assume that Tufte means that the principles are applicable across cultures and even mediums (since he looks at several different technologies – although he does omit hypermedia design). On the surface, this assumption of Tufte's seems to be contrary to the results of the many contrastive rhetoric and discourse analysis studies that have been done to prove that differing cultures have differing ideals and purposes within discourse (see Connor 1996, Hedden 1992, Smith and Nelson 1994). The conclusions reached in these studies emphasize that discourse is uniquely tied to the social group or culture that it comes out of. It is an extension of that culture. If different cultures have different goals and principles for communication, how can that discourse (which would include presentation and design as well as content) be analyzed or judged according to a single set of standards? How do design and discourse (primarily written) fit together within the realm of cross-cultural communications, especially for online discourse? While this thesis can only begin to address these questions and issues, it is certainly the case that contrastive rhetoric studies have focused more on the text and its variances from some base language than on the information design aspects of communication. Therefore, although the statements may initially seem contradictory, they do not reference the same aspects of communication. However, another aspect of the purpose of this thesis is to begin to bridge these two areas of study and bring them closer together.

Scope

This thesis is an attempt to create a set of web design heuristics that help to bridge cultural gaps by emphasizing universal design principles that focus on the content. I take Tufte's five principles of information design and proceed to apply these rather broad principles to web sites. This is not a task to be taken lightly, nor it is flawless or without complications. However, by using Tufte as a base, and by applying the expertise of web designers, rhetoricians, and linguists, I have tried to add to Tufte's existing work by providing data about the online medium. Thus, this thesis first explores the literature of Tufte and other experts and then tries to meld them into categories that fit Tufte's framework of the following five design principles:

- Micro/Macro – portray lots of information in a small, condensed manner.
- Layering and Separation – present information that allows page parts to interact.
- Small Multiples – repeat or juxtapose images to allow for comparison.
- Color – use with restraint to label, measure, represent reality, or enliven.
- Integration of Text and Graphics – work together to add meaning and readability.

As Tufte does in his books, I also try to support these principles by showing varying designs and microscopically analyzing them against those principles so that the reader can also see and understand the relationships. I have chosen to use international corporate web pages of automobile manufacturers so as to focus on an industry that does not have intimate connections with the online world so the designs are freer and less likely to be influenced by their competition's designs (as is often the case with computer manufacturer sites that all seem to copy each other and to use the latest high-tech gadget or interactive element regardless of the user's needs).

Based on the scoring system used in this thesis, out of the 72 sites that were evaluated, the one that most closely matched the ideals of the heuristics was SsangYong of Korea with a score of 338 out of a possible 390 points. The top score for an American site was the Ford Motor Company with 337, and the top score for a Mexican site was for Piso with 314 points. Also interesting to note is that, in general, the Korean web sites were a lot closer in scoring (they were all fairly good with using Tufte's principles) than any other group.

Assumptions and Limitations

While the analyses of the 72 sites were relatively straightforward, this necessitated the acknowledgement of several assumptions and certain limits to the validity and effectiveness of the study because of time and length restraints.

The most glaring assumption is that I take Tufte's assumption of universality at face value. This may be problematic in that Tufte is working in an English-dominant and mostly American framework (as are most of the other designers whose design principles are quoted in this thesis). I also do not question the validity or efficacy of Tufte's five principles. This thesis mainly focuses on the application of these principles to web sites, rather than if Tufte's principles are valid and universal. However, I must also acknowledge that Tufte does not adequately address the design limitations and possibilities of web sites

with his five principles of design. Therefore, I have had to extend Tufte's principles and make my own "categories" that can be applied to web site design. In effect, I have added to Tufte's work in ways that he did not intend (and may not even endorse). The process of creating and then applying my categories necessitated that I constantly define and redefine what Tufte says about his principles. Therefore, the outcomes of this thesis are entirely dependent on how I ultimately interpreted Tufte.

Tufte's principles miss some important web design areas and advantages of the web medium. First, Tufte's work is based mostly on design that does not have to contend with advertising, or the commercial aspects of design. Web designers are constantly battling the directive to include banner advertisements, pop-up and pop-under advertisement windows, and other commercial entities on a page that go against Tufte's principles and against usability guidelines in general. These ads interfere with the flow and with the user's need to get to the content quickly, but without the ads, the site may not exist. However, there are a few notable exceptions to this in Tufte's work, especially in regards to what he terms "chartjunk" or unnecessary ornamentation. One example is his analysis of a graph showing the sales of pantyhose that used a woman's fishnet panty-hosed leg to "highlight" the graph. This seems like the work of an overeager marketing executive who wanted to spice up the graph so that it would catch people's attention. Tufte really has no sympathy for this kind of extraneous design, and so dismisses it as chartjunk. In regards to this, I think that Tufte would tell web designers to take some initiative and come up with new ways of dealing with this old problem. Second, the web is extremely interactive in nature in ways that a printed medium cannot be. So, while print design must engage the reader using a flat and unchanging surface, the web page can use movement, flash movies, community bulletin boards and chat rooms, and mouse-movement watching functions that more deeply interact with a user's movements and actions, whereas a book on dancing (see Tufte's treatment of this subject in his book) cannot change, for example, foot placement information if a user makes a wrong move, but a computer program can do this. Third, a printed design is much more tangible, unchangeable, and relative to a specific point in time than a web site. Web designers respond to user feedback as well as tracking logs of user movement through a site almost instantaneously, and so a site is never a single, study-able element. For the purposes of this thesis, I captured the designs of the web sites at a certain point in time, when in fact most of the sites have radically changed and evolved in design based on user needs since the time I captured them. It would not be possible

to write this thesis without the ability to reference design at one point in time. This is partly because Tufte's principles do not and cannot account for this phenomenon, and partly because the conventions of a thesis are that it is printed and bound to a certain point in time for the writer.

Additionally, the web entails evolving conventions and principles, whereas Tufte's work is predicated on a medium that has been set for a long time. As a result, Tufte's principles do not always fit nicely into web design evolving standards, nor do some of his principle applications apply easily to a web page or a web site. I have attempted to mesh the two as much as possible in the hope that this exercise will empower web designers to improve their designs based on research in related design areas instead of just "gut instinct" or on what everyone else is doing. So, although Tufte does not always work with the evaluation of web sites because the structure he provides cannot be fitted to web sites without extending his principles beyond what he's already written, I understood this in writing this thesis in the first place. My intention was to extend Tufte into another medium as my contribution to his work.

It is also important to acknowledge that my application of Tufte's principles is based a lot on American/English design standards. So, although Tufte claims universality and uses many cultural examples to support his work, he is still an English writer and designer. But, just like in the computer industry generally, English is becoming the lingua franca of the Internet, and the design principles of English/Americans may in fact be becoming universal standards simply because there has not been a native tradition of discourse designed for the computer. The web is new and changing. Design principles are being set now, and American designs are influencing the discussions. This sets up American design choices as standards for other cultures that would not otherwise make those design choices (for example, American culture preference for left to right text reading and eye scan patterns). While this may create more cultural boundaries than it tears down, I believe that the design principles I am attempting to define in this thesis can help designers to make broad design choices that work across multiple cultures, as Tufte's design choices seem to accomplish, to emphasize the content over the presentation.

Another limitation involves the rather odd number of 72 for the number of web sites evaluated. I did, in fact, originally choose 25 sites from each country to evaluate, but when I went back to perform the actual evaluation a couple years later, two of the sites (from two different cultures) had become corrupted on my disk (and the sites had disappeared from the Internet – such is the transience and fluidity of the

constantly-changing web). I decided not to try to find new sites to make up for those two since they would have had a couple extra years of maturation on the web than the original sites I chose. Therefore, I simply removed a site from the remaining culture and used 24 from each culture.

Initially, I sent out a questionnaire to many of Ford's web site designers in an attempt to get an idea of their reasoning behind the sites, who they thought their audience was, why they designed it as they did, and so forth. However, I did not receive any responses from which to confirm my preliminary conclusions and hypothesis. Therefore, it was not possible to learn about the intentions of the web designers. While the evaluations still seem to work without this knowledge, some sites may have scored lower against Tufte's principles because of specific design choices by an expert who had a different audience or purpose in mind. The survey is included in the Appendix. Future research would do well to investigate the designer's intentions as an important aspect of web site evaluation.

I was also limited by the frequent changes to web pages. Many of the web sites reviewed in this thesis either no longer exist or look completely different in March of 1998 than they do at the time of analysis (2001-2002). To combat the continually shifting nature of the Internet, I downloaded the sites to a CD-ROM, which is included along with this thesis text. Some images and links do not work, but the reader can still get a general idea of what the site is about. Also, some images and links reference pages, images, or objects that are still available online. Therefore, I recommend that you set your web browser to "offline" use so that you can see only the material available on the CD-ROM. The reader is further encouraged to look at the current Internet pages of the company (if still available) and note changes and differences, if any.

Of additional note is that not all "Mexican" sites are from companies that are located in Mexico. Perhaps a more appropriate title would be South American. However, most of the sites are indeed from companies in Mexico, so I continued to categorize these sites together with the "Mexico" label since I did not attempt to get a representative sampling of companies from areas outside the country of Mexico, and thus "South America" would also be misleading.

Yet another important note to this thesis and any application of its principles is that the analysis works best for sites that have many pages. I found that very simple sites (as would be common with most personal web sites and many business "brochure" sites) do not usually have all the elements that apply to

the heuristics. Though a well-designed small site would score well in many areas of the heuristics, there are several that may be unnecessary to do for a small site (like a search function when the site is only one page). However, I tried to take this into account during the evaluations of each site, awarding points for a good index or table of contents where no search feature had been included, for example.

The other raters that I used to verify the reliability of my own rating (to ensure that I was fairly objective) were all Americans, although they had all (except one) lived in foreign countries for at least a year. However, future research would need to use raters from varying cultures and backgrounds to solidify the rating criteria as easy to use and universal.

Finally, ideally, this thesis would have only focused on automobile manufacturer web sites for doing evaluations. However, it was not possible to find enough Korean or Mexican web sites to fit this requirement and to also give an accurate representation of a culture's sites. So I broadened my scope to include the web sites of companies that were involved in any way with transportation products or auto part manufacturing, as long as the audience for the site was international (they declared themselves as importers or exporters). It may have been possible to find a field where all sites in all languages were of the same specific category type, but I wanted to stay away from any company that worked a lot with computers since I wanted pages of companies that did not have a vested interest in the Internet itself. I wanted to focus on non-Internet savvy companies (as far as that was possible) and those companies that were newer to the Internet.

Justification

It is becoming increasingly important in this "Information Age" for web designers not only to be good writers and thinkers, but also to be proficient in document design and to be web-savvy. However, as analyst Bridget Newell says, "We don't want to sacrifice good writing for technological proficiency, but we cannot ignore the importance of understanding and using technology" (Newell 34). It is important for designers to somehow meld the content and the technology into a coherent whole. One goal for this thesis was to provide designers with an evaluation method that helps them to bridge the current gaps between the content and the design.

The reason I am using business pages of automobile manufacturers is to make sure that I get a good representative sampling of web pages that have not necessarily been designed by those who have

design principles or common computer and Internet interfaces in mind, but rather by those who are focused on trying to sell a product to an international audience.

I have chosen to use American, Korean, and Mexican automobile-makers as representative samples of what is available on the Internet at present. Although there are many other automobile manufacturers in other countries which would perhaps be represented here just as well as any other, my point is to show what is being done, and if and how it conforms to Tufte's principles. The three countries represented in this thesis do, however, give the reader a good idea of what is on the Internet at present and how web pages are being designed by various cultures. However, the choice of these three cultures was not made haphazardly; several factors affected the choice of countries of America, Korea, and Mexico studied in this thesis:

- According to the PC Magazine study previously mentioned, in 1996, Spanish speakers accounted for 10% of the online population. Thus, with such a large representation of the population, I wanted to see how their "voice" was affecting web design.
- Korea seemed a natural choice given the ongoing popularity of Kia and Hyundai, as well as Korean auto parts in general. I anticipated that this culture would easily provide 25 sites.
- The American companies function, in some ways, as the "control group" for the study (given the typically American attitudes and culture of the Internet). However, the sheer number of American automobile manufacturers in America also makes it a natural selection, if only to use the sites for comparison purposes against each other.

While these limitations and assumptions constrain the work contained in this thesis, they have not hindered the purposes and goals of this thesis.

Purpose

The main goal of this thesis is to share with fellow academia what I learned while attempting to create this set of heuristics and then use those heuristics to analyze web site designs from a few different cultures. I wanted to enlighten contrastive rhetoric analysis and to begin to provide the necessary tools in performing that analysis and understanding those communications, as well as bring it and information design closer together in the designer's view. In the end, I hoped to better understand multi-cultural design issues and to determine how Tufte's principles can be applied to web sites while adding data about this

important medium to Tufte's work. While this definitely occurred, I came to develop a different set of purposes than I had originally planned.

I came to see the World Wide Web as its own unique, newly formed culture where the presentation of information is essential regardless of the language used or understood by the user (computer translation services help to overcome this barrier). Thus, I analyzed the site's design in the designer's (assumed) first language (if it was available) and not the English version. I wanted to evaluate a culture's design using the developed heuristics, rather than a design made for the English-speaking world. My purpose was to create a fairly broad set of heuristics based on universal, multi-cultural principles to guide a designer toward more cross-cultural designs that focus on content rather than fluff.

General Outline

This thesis is organized into several different chapters and includes a comprehensive set of appendices containing further research and more detail. While it is assumed that you will read this thesis from beginning to end, it is possible to skip certain chapters or sections depending on your needs. Each chapter starts with a brief introduction and a roadmap of the sections within the chapter, so you can jump around as needed. I have provided hypertext links in many places (the blue, underlined words) for the online version of the thesis that can help you in this process as well.

I first provide a review of previous research related to the design and use of heuristics in Chapter 2, in order to better define the need and value of applying information design principles to web sites. Specifically, I have targeted literature related to discourse analysis and contrastive rhetoric, discussions of orality and narrative discourse and how they can apply to web site analysis, information about hypertext and the Internet, and writings regarding information design and web site design.

In Chapter 3, I explore the methodology used to create a rubric for web site evaluations, as well as the methodology used to make those evaluations. These components include basic web site evaluation techniques and the application of Tufte's principles to web sites.

Next, for Chapter 4, I discuss the results of doing a microscopic analysis of each web site's design using the heuristics, including comparisons of sites and cultures based on the results.

The thesis concludes with Chapter 5 by summarizing the findings into concrete conclusions and analysis based on the purpose of the thesis, as well as a section of recommendations for further study.

CHAPTER 2. REVIEW OF LITERATURE

The methodology and analyses that are required to support the design of this set of heuristics span several areas of study. Thus, it is important that I provide a review of the literature from each of those areas, and attempt to bring them together so that you can get the bigger picture that this thesis attempts to address.

In this chapter, I discuss the following topics:

- A general overview of each of the areas of study and why they apply.
- The studies of contrastive rhetoric and discourse analysis.
- Analysis of orality, literacy, and narrative as they apply to web sites and hypertext.
- The history and structures of hypertext.
- An overview of interface and web design literature and its importance.

General Overview

It was Theodor Nelson who is said to have coined the term "hypertext" to refer to written or graphical information that is so complexly interlinked that it would not be possible to present or represent it on paper. Web pages rely on a hypertext system to guide readers through a web site and to provide access to other, related sites. In web pages, information is organized by interrelated subjects (Smith and Nelson 232). However, the way that a reader approaches the web pages within a site is entirely dependant on what they decide they want to see. Hypermedia pages are not just read, they are explored. Information on web pages or within a web site is not necessarily arranged in a linear fashion, and readers can easily jump in and out of a text at the click of a mouse on a hypertext link or a browser button (the "Back" and "Forward" buttons on Netscape Navigator, for example).

Because hypertext systems, and especially the Internet, are relatively new cultural phenomena, the medium and its design guidelines are constantly in flux, both because of its very nature and because of the continuously shifting mores and principles around communication in this medium. Even more troublesome for those who would help to bring in some standards to the medium is the fact that other research methods or study methods may not be the most effective at gathering data in this medium. Patricia Ann Carlson acknowledges that "the field is still new and lacks a record of experience and a systematic assessment"

(Barrett 59). Thus, authors and readers in this medium are still trying to figure out how communication works best as they generate the new register of web design and web browsing. Jay David Bolter adds the following idea: "Each technology in the history of writing . . . has presented writers and readers with a different space to exploit" (Delany and Landow 105). Since we are still learning how to use computer space and this new writing technology, we often stumble in our attempts at communication. Also at issue are our expectations for written discourse (meaning on paper or another tangible element) that do not always coincide with the hypertext medium.

Other researchers have noted the discrepancies between the two mediums that cause us problems. "The elements of cohesion that contribute to the readability and usefulness of paper documents, such as transitions, redundancies, and pronouns, represent problems in hypertext" (Smith and Nelson 238). These differences can lead to problems even for native readers. Thus, it is important that we work to better define this new technology. In the introduction to Hyper/Text/Theory, George Landow claims to have written his prior work, Hypertext: the Convergence of Contemporary Critical Theory and Technology, "in part to convince literary theorists and computer specialists that they have interests in common and might therefore wish to talk to one another now and then" (Landow, editor 1). This thesis is also an attempt to bring together the theory and the specialists so that we can all communicate better because of the potential changes and the results of the discussion that this thesis continues.

Contrastive Rhetoric and Discourse Analysis

Part of the discussion must necessarily revolve around the nature of the discourse within this hypertext field. For, while the information design is key to creating a working communications channel in this medium, content is still king, and cannot be forgotten. Content and presentation are so closely tied because the presentation influences the effect of the conversation, especially from the receiver's point of view. To begin, we must first understand what the discourse means. Semiotics expert M. A. K. Halliday writes, "Semiotics can therefore be defined as the general study of signs" (Halliday and Hasan 3). He then modifies this definition slightly to the include the "study of sign systems" since all discourse is tied to other parts of discourse, both present to and recalled by the sign sender and the receiver. He also generalizes the definition even more to the "study of meaning" (4) in order to point out more clearly that communication is

about relationships and, ultimately the ties that bind the signs together to create meaning and understanding for us.

Without this tie, this "cohesion" of signs, communication breaks down because we lose the meaning of the signs. Semiotics, especially the social-semiotic perspectives of Halliday and Hasan, aligns quite well with contrastive rhetoric and other aspects of linguistics. "Linguistics, then, is a kind of semiotics" (4), writes Halliday. Thus contrastive rhetoric makes up a part of semiotics. Why only a part? Because, according to Halliday, "There are many other modes of meaning, in any culture, which are outside the realm of language" (4). As I stated earlier, contrastive rhetoric and discourse analysis have been used to study language (spoken or written) outside the context of the extra-textual ties and information design. Halliday gives examples like the arts and modes of dress to clarify the kinds of signs that affect the meaning of the discourse. We can extrapolate this a bit to include the graphics and design inherent in a web page (or even the lack thereof). Additionally, links can also act as a kind of "cohesive tie" to connect the site together when they are designed so that both linked nodes have a relationship, such as similar wording or a return link to the referring page, creating what is termed "co-referentiality" (73). Because it helps to eliminate confusion, cohesion is an important part of web design and of discourse studies.

The purpose of contrastive rhetoric is to analyze the discourse that occurs between cultures and to search for cultural differences. Knowing this information can help people communicate better with those of other cultures because they can appreciate the differences rather than stumble over them by focusing on the differences to the detriment of the message. Contrastive rhetoricians examine "written texts in order to describe and account for culturally-specific differences in the rhetoric underlying them" (Martin 55). Their goals are to understand the differences that occur in texts, especially in those that attempt to communicate across different cultures. In an introduction by Deborah Tannen, readers learn, "In more cases than not in our modern world, communication is in some sense cross-cultural" (Tannen xiv). Culture is often defined by geographic boundaries but, as Tannen points out, that misses the fact that everyone comes from unique surroundings and heritage that impacts their "rhetoric" and how they communicate with those who are supposedly part of their same "culture". Alan Purves confirms this when he writes, "Written texts, and the ways in which they are used and perceived, vary according to the cultural group to which an individual belongs" (Purves 10). This has a huge impact on web discourse because of all the possible different

cultures that can access a single web site. On the one hand, the web is creating its own unique culture, and on the other hand, the steps to getting there are blocked by varying perceptions of the same discourse. This is where I can see big advantages for having a universal set of design guidelines for cross-cultural web sites that serve to emphasize the content so that it is perhaps better understood because some of the background noise and disjointed "cohesivelessness" that often exists out there currently has been removed.

Still, though, even with a "perfect" Tufte design, there is opportunity to misconstrue a meaning because of different class distinctions or by an empowered someone imposing their perceptions on another. This has been a continual concern with contrastive rhetoricians, especially in regards to computer interfaces (see Selfe and Selfe 1996), which seem to empower the already empowered and subjugate others. This empowerment is caused because of the specialized knowledge required to operate a computer and its interface, as well as the (previously) prohibitively high cost of computer ownership, thus enabling access to only wealthy, well-educated people (especially those educated in computer use).

However, researchers have often found that the levels of empowerment and cultural chauvinism play big roles in the effectiveness of discourse between two cultures. The United States is often considered to be ruthless in creating and maintaining feelings of cultural supremacy. In general, U.S. citizens stereotypically believe that their culture and lifestyle is the only acceptable way. Caren Kaplan asks, "How to deconstruct the privileges of race, class, and gender supremacy in the United States and rearticulate identities and alliances? This is the work that elite and relatively empowered groups and subjects must engage in continually in order to be credible participants in social change" (Kaplan x). According to Kaplan, it is the responsibility of those who do have the power within a group to engage in, and even initiate, the discussions around how to create discourse in this new medium. Even I have some small power in this group because of my position as both a well-educated student and as a teacher within this thesis. My thesis work is, then, an attempt to engage in these discussions and to try to provide suggestions and possible solutions for cross-cultural discourse problems even though I and those who helped me with the evaluations are part of the "privileged" upper-middle class Americans: we must first engage in the conversation and then see where it takes us.

In the past, researchers have forced themselves to engage discourse in limited ways so that their own biases and preferences do not color the perceptions of the discourse being studied. In the preface, "On Analyzing and Evaluating Written Text", Coulthard writes:

> The advances in descriptive linguistics of the last generation should give us the confidence to re-introduce evaluation, to admit what we have always secretly acknowledged, that some texts and some writers are better than others, and to try to account not simply for difference and for how existing texts mean, but also for quality and for why one textualization might mean more or better than another. (Coulthard 1)

Coulthard emphasizes that evaluation is not wrong or bad. Implied is the notion that no matter what we do, our own personal "rhetoric" will affect our analyses. We just need to acknowledge this, accept it, and use it to our advantage.

By creating a universal rubric instead of a biased agenda, I mean to alleviate some of the problems caused by forced implementation of one culture's design principles (by using Tufte's universal principles as a base) and still allow for some leeway in evaluation by using heuristics instead of a hard and fast scale. While this does not mean that a site will be scored exactly the same for every person who evaluates it, it does mean that the scores should provide a good general indicator of how well the site uses Tufte's principles. In the rater tests that I ran, it was obvious that some categories were much more open to interpretation than others, and so the scores fluctuated quite a bit. However, on average, the scores never fluctuated more than one point in either direction. Thus, we can be fairly confident that the heuristics I've put together are fairly consistent and useful for a variety of evaluators.

In many ways, these evaluators are performing discourse analysis of the web site. As such, it is important for evaluators to develop several qualities. Martha Nussbaum teaches the reader how to analyze/judge any type of narrative with the following instructions: "In order to be fully rational, judges must also be capable of fancy and sympathy. They must educate not only their technical capacities but also their capacity for humanity" (Nussbaum 121). From this, we take that it is important to value and recognize creativity in a design instead of focusing solely on the scoring of the heuristics. A "perfect" Tufte web site does not have to have the same design as another "perfect" Tufte site. The heuristics I have created try to allow for a lot of flexibility in what kinds of themes and colors to use, for example. I did not want to try to

regulate the discourse or the kinds of discourse that can take place on a web site, only analyze and evaluate how that discourse occurs and how well it matches Tufte's information design principles.

Orality and Literacy

Communication via the Internet takes many forms. One that stands out strongly, though, is the oral form. According to Walter Ong, the computer revolution has initiated a new age of orality. "The electronic age is also an age of 'secondary orality', the orality of telephones, radio, and television, which depends on writing and print for its existence" (Ong 3). He then continues with discussions of how the web is more oral than literate in expressions. "Written texts all have to be related somehow, directly or indirectly, to the world of sound, the natural habitat of language, to yield their meanings" (Ong 8). He asserts that we always have to match sound to what we read, either internally or externally. So, although our culture has added the writing technology to our knowledgebase, we still exhibit traits ingrained in our collective unconscious from our previous solely oral culture. It is a bit ironic that we regard Plato so highly as a great thinker and writer, when "Plato was thinking of writing as an external, alien technology, as many people today think of the computer" (Ong 81).

However, audible communicative means are not the only ties that web discourse has to oral culture. Phillip Rubens notes how the new "visual literacy" (Barrett 20) of web pages and graphics will impact education since it changes around the notion of literacy as involving just word recognition. He then explains that visual designers need to develop new vocabularies and grammars around this new literacy. My purpose for this thesis matches those ideas exactly: by developing a new grammar (i.e., rules of discourse) around design elements. Oral cultures not only rely on what they hear in discourse, but the expressions, movements, and gestures of the orator, to recall and participate in the discourse. Even those orating need some visual and audile cues to help them communicate. "Oral cultures require mnemonic devices for thought and communication. These include repetition and rhythm" (Ong 34). Redundancy helps the mind "backloop" (Ong 39-40) so that the orator can tie the pieces of the narration together in their mind. They also make extensive use of visualization, as when Ong describes the ". . . relatively sophisticated processing of verbalized material in chirographic cultures so as to make the material more immediately retrievable through its spatial organization" (Ong 124). Here Ong references Jack Goody's studies of lists as means of stimulating the memory. However, orators have used other techniques to help

them visualize virtual places in the mind, like a house that contains pictures on the walls that the orator discusses as they move through the house.

With the advent of writing, Ong points out that the alphabetized index was "actually a crossroads between auditory and visualist cultures" (Ong 125). The book at first seemed less like discourse and more like a thing that contained utterances. Only after the book was more internalized into the culture did it start to become something that contained information (Ong 126). Here, the break is from something written down of what was said to something that never had to be uttered externally before being written. The reason that Ong styles our time as a secondary orality is because web "writing" is inherently different from writing that we have gotten accustomed to in our culture.

While web "writing" is inherently different from other writing, it does share some common ground with other written discourse that can help in better understanding and evaluating web communication. First of all, it has fairly strong ties to concrete poetry since neither can be read aloud very well (Ong 129). As with concrete poetry, web writing uses presentation to help convey the message and to give meaning to the content. Because of this, traditional contrastive rhetoric or discourse analysis studies cannot fully explain or analyze cross-cultural communication across the world wide web. They need more tools for analysis that deal with the visual and the presentation layers of web discourse. This thesis is an attempt to fill this gap by providing the heuristics that researchers need to add to studies of the text itself that can help them start to explain how well (or not) a web text conveys its message and the techniques the designers used to accomplish (or not) that.

Web pages also share some aspects in common with narrative discourse. James Phelan describes narratives as involving "teller, technique, story, situation, audience, and purpose: all the elements that help determine the shape and effect of the story" (Phelan 4). One could argue that all discourse necessitates the use of these narrative techniques, and so this definition does not truly capture the essence of narrative. The main point of departure for web discourse, especially for business sites, is the story element. While discourse of all types conveys some type of story – meaning a written or spoken account of events – narrative stories imply something akin to a plot, which is not necessarily true of web discourse. At least at a high level, though, narrative and web discourses share the same elements of discourse. Adam Newton furthers the definition of "narrative as relationship and human connectivity" (Newton 7). This is perhaps

the best tie between narrative and web communication. If nothing else, the web engenders connectivity between the audience and the information giver and among the audience itself. "Secondary orality has generated a strong group sense . . . immeasurably larger than those of primary oral culture – McLuhan's 'global village'" (Ong 136). Ong explains that primary oral cultures were group minded because they were constantly focused outward – there was no concept of inward thinking. Our secondary oral culture is group-focused consciously and programmatically because we feel a need to be good world citizens and to be socially sensitive. Oral and hypertext discourses are also episodic, just like narrative. Each web page needs to be self-contained (Ong 146) so that it can be understood outside its site content. Without this, users who happen to come into a site in the middle of the site will get confused because they do not have any frame of reference to account for the information on the page. This also goes back to the necessity of cohesive ties that Halliday and Hasan point out, which help to alleviate some of the feelings of being lost in space that hypertext engenders.

However, while oral and narrative discourses are similar in form, oral discourse does not care much about when events occur temporally to each other. Ong states, "Memory, as it guides the oral poet, often has little to do with strict linear presentation of events in temporal sequence" (Ong 147). The orator is not as concerned with the chronological order of events because they emphasize certain sequences based on audience needs or reactions. On the other hand, narrative is traditionally focused around a storyline. "Of course, narrative has to do with the temporal sequence of events" (Ong 147). A web site uses more than just text to convey the message; it uses graphics, colors, the organization and presentation of information on the page, and audience interaction – similar to oral discourse – to communicate in ways that cannot be easily strictly read aloud, but must be explained and visualized by the audience.

Some critics suggest that web pages mask the "human" and the relationship because of a lack of personal contact, especially in regards to corporate pages. However, web pages can still provide a sense of personal contact, even if the sender and receiver cannot see each other and even though the communication is often asynchronous with when the message was temporally sent. Mary Louise Pratt says that computer interfaces are contact zones where "cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power" (qtd. in Selfe and Selfe 482). Although no personal, face-to-face, communication is taking place on the Internet, the interaction is occurring – just usually on a time-delayed

basis. Designs that make use of personalization techniques, dynamic text, and feedback areas all help users to experience more "personal" contact with the site because they start to feel like part of the community engendered by the site. This is part of the reason why the Internet is creating a brand new culture that transcends physical and language boundaries. Still, though, the transition to this new culture will take time as people's current culture affects and complicates the discourse of this new culture. Robert Kaplan, applied linguist, contends that "contrastive rhetoric maintains that language and writing are cultural phenomena" (qtd. in Connor 5), and therefore all writing must contain cultural ideals and traditions, regardless of the genre. In addition, Ulla Connor writes that "Bakhtin locates the linguistic dimensions of genres in social groups . . . [and] texts are ongoing processes of discourse production and reception that are always tied to other texts or utterances in a culture" (Connor 128). Culture is inseparable from text, any text. The content creator's cultural background, ideas, and values are tied to the content and presentation, and the content and design are a reflection of those traits. Thus, each culture's discourse has its own unique features. These features are all being added and sifted through as people learn to communicate with hypertext and the online medium. This new culture will be a mixture of the cultural backgrounds and texts that pick up and continue the discourse. By using a set of heuristics, in effect rules of grammar for the new web language, that are based on universal design principles, participants can ensure that the message does not become confused by either the medium or the cultural presentation.

Use of heuristics alone, however, does not guarantee instant communication or understanding. The designs and content need to help connect people. Dwight Furrow writes about Martha Nussbaum's theory that "because the spheres of experience are common within all of human experience, competing specifications of the virtues will nevertheless be disagreements about the same thing" (Furrow 92). People share common experiences that, although they may be called by different names, bind us together as the human race. So, although our individual cultures separate us in some aspects, our common ground of experience ties us together and gets us closer to understanding. Designers must build on these "universal" experiences to help bridge existing cultural gaps and conflicts. People come to web sites with preconceived notions, ideas, cultural backgrounds, and their own version of reality. So, bridging understanding is no easy or simple task. "Understanding, in this view, is a form of self-assertion, which according to Levinas fatally misconstrues our capacity for moral judgment" (Furrow 141). It is important to acknowledge that any

evaluation of a web site, especially one that is not one's own, can have a negative impact on the judgments we make. When we base those judgments on a universal set of principles that we can apply to multiple web sites, we are taking steps to move away from personal judgments and into group comparisons and evaluations.

Hypertext

The hypertext arrangement of information is generally thought of as a relatively new construct (despite its fairly prevalent use over the last twenty years). It is so new that we even have difficulty in writing about it or describing it. George Landow describes it in the following way:

> Writing about hypertext in a print medium immediately produces terminological problems much like those Barthes, Derrida, and others encountered when trying to describe a textuality neither instantiated by the physical object of the printed book nor limited to it. Since hypertext radically changes the experiences that *reading*, *writing*, and *text* signify, how, without misleading, can one employ these terms, so burdened with the assumptions of print technology, when referring to electronic materials? We still read *according to* print technology, and we still direct almost all of what we write toward print modes of publication, but we can already glimpse the first appearances of hypertextuality and begin to ascertain some aspects of its possible futures. Terms so implicated with print technology necessarily confuse unless handled with great care. (Landow 57)

Landow specifically points out the terms of "book" and "text" that cause us problems because of the contradictory meanings they have inherited. The clash comes because of our print technology-based assumptions about what "text" is and does. Equally disconcerting is the fact that the hypertext construct is not a permanent vestige like a book. "Unlike the printing press or the medieval codex, the computer does not require that any aspect of writing be determined in advance for the whole life of the text" (Bolter in Delany and Landow 116). Thus, we cannot think of hypertext in the same terms as a book or words on a printed page, even though we do in fact try to read them in the same way that we try to read a page of text; because the text is part of the constantly changing universe of online technology, where each web page contributes to the culture and the discourse and builds on it, and in so doing changes its meaning in relation to all other discourse. Hopefully, though, my previous discussions about orality have helped to think of hypertext a little differently already so that the boundaries are not quite as stark.

These boundaries are created when people do not know how to deal well with the non-linear information spaces prevalent on the Internet. Some research has been done to identify the things that can help alleviate reader confusion. "Capacities such as full-text searching, automatic linking, agents, and conceptual filtering potentially have the power to retain benefits of hypertextuality while insulating the reader from the ill effects of abandoning linearity" (Landow 77). These elements are part of the cohesive bonds that need to be created for the reader so that they can participate in the discourse. Readers need to be able to find the information and process it. David Herrstrom and David Massey explain, "Information is accessible if users can find it both when they know what they are looking for and when they do not" (Barrett 47). Therefore, web designers need to create sites that are easily accessible and navigable.

Contrary to the popular image reinforced through the media and other information sources that discuss the Internet in such terms as "intricate web" and "information overload", proper navigation and site structure are important aspects of any useful site. Edward Barrett believes that "not only information (and therefore knowledge) but also reality itself is a construct, and that hypertext is a paradigm for the construction of knowledge (and by extension, reality)" (qtd. in Hedden 27). This suggests that hypertext is the concrete embodiment of reality based on humankind's level of knowledge. Hypertext is merely an extension of complex thoughts and ideas, arranged in such a way as to show relationships and similarities. Patricia Ann Carlson explains that hypertext "is intended to augment human thinking by providing a dynamic platform for processing and presenting data" (Barrett 62). Hypertext's purpose is to help frame information data in ways similar to how we store information in our mind – by making and remembering connections. Writing technology can only make references that help us to create mental associations, but a hypertext document can link to another text, and in effect the original hypertext document is now a much larger document where the reader can immediately make the connection between the reference and the referent. Additionally, David Jay Bolter points out the hypertext medium allows for very different kinds of text: "True electronic writing is not limited to verbal text: the writeable elements may be words, images, sounds, or even actions that the computer is directed to perform" (Delany and Landow 113). The web page can include many elements that help readers to make visual and auditory connections between pieces of information.

Even if a web site uses these elements, it does not mean that the reader will not get confused or lost. "Location is one of the most difficult problems in hypertext. Electronic presentation of text removes most of the visio-spatial cues available in paper. Adding to the confusion, hypertext encourages fragmentation and the proliferation of small nodes" (Carlson in Barrett 66). Since we are so accustomed to having these visual cues in the way that paper supplies them (page numbers in the header or footer of a page, relative location within a book, etc.), hypertext discourse must find means that are similar enough to help the transition, yet means that still take advantage of the nature of the medium. Carlson provides some suggestions that can help in the transition: "Adopting some form of visualization vastly improves system usability. Three candidate methods include (1) an iconic interface, (2) a filtered view based on one or more specific criteria, such as proximity, (3) a contiguity or logic map" (Barrett 66). I have tried to include these types of things in the heuristics as well since they are intimately involved in how well a user can access a site and its content. When designers can employ these types of ideas in a site, it accomplishes several goals. Landow explains, "Devices of orientation permit readers (a) to determine their present location, (b) to have some idea of that location's relation to other materials, (c) to return to their starting point, and (d) to explore materials not directly linked to those in which they presently find themselves" (Delany and Landow 86). All these concepts revolve around helping the reader better visualize the hypertext space and make it seem more concrete and stable. While hypertext's true power is in making connections and presenting vast amounts of information, if the readers are confused, they will not be able to make use of that power.

The hypertext link, in particular, is a defining characteristic of hypertext. Landow explains the extent of linking's power in the introduction to Hyper/Text/Theory: "Electronic linking, which provides one the defining features of hypertext, also embodies Julia Kristeva's notions of intertextuality, Mikhail Bahktin's emphasis upon multivocality, Michel Foucault's conceptions of networks of power, and Gilles Deleuze and Félix Guattari's ideas of rhizomatic, 'nomad thought'" (Landow 1). Thus, it is evident that hypertext and poststructuralism both arose out of dissatisfaction with the printed book and its limitations, most poignantly the limitation of connections and references to other works. Linking helps authors and readers to more fully engage the text and its implications within the discourse.

In order for a reader to obtain meaning from a message, they must produce or reproduce understanding from the communication. Rhetoric studies ties in with this need to understand the author,

reader, and discourse structure of hypertext. Indeed, many studies have already been done on the relationship between hypertext and rhetoric. But, according to Gunnar Liestøl, Roland Barthes' five components of the "rhetorical machine" have not been addressed. Liestøl explains how these components relate to the reader of hypertext:

> Readers of a hypermedia message act within a similar structure [of ancient rhetoric's inventio]: they select existing elements or nodes from the message material and read in their given shapes (outside-technè). But elements existing as complete documents or nodes in the hypermedia message may be only partially selected, dependent upon the reader's punctuation in the chain of signifiers. The reader may read a whole node or only parts of it before following a link. This manipulation and imposing of a different order (ordo artificialis) upon the given structure of stored segments in the message (ordo naturalis) may be characterized as an operation of the orator (hypertext reader) within-technè. (Landow 100)

Within hypertextual discourse, the reader/author relationship is much more fluid and dynamic, allowing the reader to become secondary author by selecting their own nodes or links.

The second component, dispositio (taxis), provides a means to order the information. Of particular interest in discussions of hypertext messages is the existence "of a moveable element, abstracted from fixed parts" (Landow 100) that shows that the rigid rules of rhetoric also allow for flexibility and interchangeability. The orator has the option to choose a particular course; just as the hypertext reader has the option to select nodes or links within a given structure.

The next component involves the design, or elocutio, which is the piece that makes argumentation possible. "Elocutio in computer discourse concerns not only linguistic ornaments but also the graphic layout on the screen and the way signs and icons trigger action and interaction. In hypertext, interface design, layout, the information value of link icons, and so on all belong to elocutio" (Landow 100). The author and reader must cooperate here so that the message can be arranged in the most persuasive manner. For the author, this includes gaining an understanding of the audience and their needs (see the discussion of interface design and usability). Only when the information is designed, as a speech is carefully formulated to make a specific impact, using more than just the words on the "page" will the author be able to approach the realm of persuasive argumentation.

Actio (hypocrisies) is the next component that can be considered with hypertext. Actio involves how the discourse is performed. "The ancient concept of action has two relevant links to hypertext and computer communication: action as 'inter-actio-n' (man-machine interaction) and also as acting when the user is given a role according to which characteristics she or he acts and interacts" (Landow 101). From this, I gather that action is as important part of discourse and web designers need to try to give the user as many opportunities to interact with the hypermedia as possible.

Finally, memoria (mnémè) corresponds to the strategies and techniques of committing the speech to memory. The techniques for remembering where you are in a train of thought when presenting a speech involve navigation. And navigation has been a major concern to hypertext research and development" (Landow 101). Navigation is the glue that holds the Internet together in that it lets us make connections between texts without having to personally own that text. Landow also supplies information relative to why navigation is important: "One device especially important to those creating materials for the World Wide Web uses visual indications of a lexia's identity, location, and relation to others. These signals can take the form of header icons, color schemes, background textures, linked icons that appear at the foot of the lexias, or all of these in combination" (Landow 144). By understanding location and placement, readers are able to better comprehend context. While authors in no way expect their readers to memorize the web "speech" as in memoria, it is important for designers to develop navigation systems that are familiar and useful for users so that they can run through the site as easily as reciting a well-memorized passage of text – without thought.

These last two components have not had much application to written discourse studies, but they gain new meaning for hypertext studies.

> Barthes excludes memoria and actio, believing them to be residual elements of oral culture that are superfluous within writing and print technologies. The fact that these operations gain new relevance from hypermedia supports Walter J. Ong's key argument that electronic culture, including computer technology, forms a secondary orality, an orality one step beyond literacy but dependent upon it. (Liestøl in Landow 102)

Here, Liestøl ties hypertext back with orality, and hence, the structures of oral rhetoric. Some argue that hypertext is an American invention that is based on Western thought. Although American/Western thought

has almost undeniably affected web site design, based on Liestøl's and Ong's analysis (among others) it is clear that hypertext has deeper roots. It is merely an attempt to reflect the complex thought processes of the human mind.

The organizational differences of discourse patterns shown by Kaplan's famous 1966 study (cited in Connor 15-16) give evidence of the complexities of communication within various cultures. Especially poignant in relation to this thesis are the Semitic series of parallel coordinate clauses, the Oriental indirect approach, and the Russian digression and use of extraneous material. These constructs easily tie into a hypertext arrangement, as opposed to the direct, linear approach common for English discourse. So, hypertext may in some ways be able to act as a sort of equalizer for cross-cultural communication, as it gives greater viability to alternate forms of discourse structure and may even begin to accustom American audiences to many different forms of discourse, and hence designs.

Interface and Web Design

Web designers are now considering the audience's experience with a site's design more often as they create or modify a web site. The works of pioneers like Jakob Nielsen, Hugh Beyer, Jared Spool, Don Norman, and Andrew Chak have had a tremendous impact on web site and interface design. Designers are beginning to see that text without presentation would be just a long string of letters. "Tufte describes his general principles of information design as strategies for enabling readers to 'envision' information – that is, to understand, document, and communicate knowledge" (Zimmerman 310). Effective design can aid users in understanding and envisioning the big picture of that design. "The user interface of a system is equivalent to the decoration of a house. It matters, but if the structure is wrong, no user interface can fix the problems" (Beyer 303). Just making a site look pretty or "cool" is not enough to enable readers to use it effectively. It merely becomes what Tufte terms as "chartjunk", snippets of data that tease the reader but is just "posterization", that is useless and counterproductive for users.

Design must be coherent and consistent across an interface to support the user's goals. This is emphasized by John Gunperz, Hannah Kaltmann, and Mary Catherine O'Connor when they write, "Elements in a text must be tied to each other (or disconnected from each other) in such a way as to signal a continuously developing theme" (Gunperz 5). A well-developed theme helps the designer to tie the design together for the reader and to guide them through their tasks more easily. Consistency across a design is a

recurring principle in many interface design guides and theory. Above all, though, is the principle that a design must be "designed" and not merely thrown together. Significant amounts of planning and attention to details are necessary parts of the design process in order to create a useful product and one that users will "buy" either with their money or with their time.

Since web page designers are interested in "selling" information to their readers, strategies that would help readers grasp information are in high demand (as evidenced by the over 200,000 pages found by a search of the Internet for "web site design"). The application of Tufte's principles can help the designer and reader interact with information with more openness and to give the designer the ability to give the reader that option. The main principles Tufte espouses are micro/macro design, layering and separation, small multiples, color and information, and integration of text with graphics. Tufte's principles account for quality and meaning in page design. Following them helps a web designer to create meaningful data for all cultures and social groups.

Tufte's principles of design can be found in places in web design guides' recommendations, even if they are not all in one place or consistent across design recommendations. So, it seems that his principles of micro/macro design, layering and separation, small multiples, color, and integration of text and graphics can be used to evaluate the effectiveness of web pages. Although each site has a different design and style, they have the same types of audiences and purposes, and that audience influences their content and interface. In the case of this thesis, the audience is generally just browsers who are interested in automobiles, either in buying or in creating an import/export relationship. It is important for designers to know their audience, though, and design for that audience, regardless of the audience that a similar site or company thinks it has. Thus, it is also important that a set of heuristics do not hinder this audience/designer relationship.

The influence of an audience on a design's meaning is central to the methodology of Hugh Beyer and Karen Holtzblatt, called Contextual Design, for helping interface designers to create useful and data-rich designs based on user needs. They explain the concept as follows:

> Contextual Design (CD) is an approach to defining software and hardware systems that collects multiple customer-centered techniques into an integrated design process. Contextual Design makes data gathered from customers the base criteria for deciding what the system should do and

> how it should be structured. It makes deciding how customers will work in the future the core design problem and uses those decisions to drive the use of technology. (Beyer 3)

Although their work is focused on software interfaces, the principles are often applied to any type of design process. The focus of the contextual design process is the user and what they need. "The challenge is to keep the system work model *coherent*, so that it supports the users and fits with their expectations while extending and transforming their work practice as prescribed by the vision" (Beyer 295). Beyer and Holtzblatt focus the designer's attention on the user's work model, how the user completes tasks, so that the design aids the user and supports their tasks. This is central to effective web design, where a site designer must determine what tasks the reader may have and how to create a design that will accommodate those tasks. This is also core to the heuristics I developed since they had to be broad enough to allow for user needs and dependencies. These heuristics also needed to include concepts from interface design because the presentation aspects of the site must be polished and coordinated with researched user tasks.

Interface and web designers have found that it is very important to understand their users. Many designers create a user persona or personas that consolidate the attributes of specific users into a single set of personas. Web site designers must also do the same so that they know who it is that will be using the site, why they will use it, and how they will use it. In a general sense, the audience for each of the web sites that are analyzed in this paper is an importer or purchaser from another culture. It is someone who is interested in a company's automobiles or its parts. However, each site has its own unique audience based on the type of automobile or part and on the target market segment. Some sites do better with understanding their audience, and designing a site specifically for them, than other sites. These sites can use Tufte's principles to good effect in determining design choices based on user feedback, instead of just using the heuristics as a set of design commandments that do not allow for any variation or leeway.

CHAPTER 3. METHODOLOGY

This thesis study was used to examine the designs of 72 auto manufacturer web sites from three different cultures. To accomplish this, Edward Tufte's five principles of information design were used to develop a design rubric that was specifically applicable to web site analysis (see Scoring Heuristics in the Appendix). The rubric is based on information design principles, as well as design recommendations from an assortment of professional web site and user interface designers. Despite the fact that Tufte's principles are lacking in many areas of design relevant to the web medium, nevertheless, I am still applying these principles broadly to web site design. It is in the development and use of the design heuristics that we can get true learning and meaning from Tufte: we can see the limits and merits of his work. Therefore, the heuristics are supported using other design recommendations – people who have a lot of design experience and knowledge, especially in relation to Internet design. Thus, these other design recommendations helped in creating the heuristics in the first place, support the categories created, and provide detail where Tufte does not, especially in areas relative to the web medium. Therefore, the evaluation forms and scoring guidelines created for this thesis cannot be used as a formula for cross-cultural design. These principles are merely guides. Any attempt to implement these as hard and fast rules would probably result in counter-productive communicative effects. Yet, these guidelines can aid those who are in need of recommendations for what can make a web site more culturally accessible and universal.

This chapter focuses on the following areas:

- An overview of the methodology.
- A summary of how Tufte's principles were applied to Ford's web sites in order to help create the heuristics for the rest of the study.
- A detailed explanation for each category in the heuristics that gives information about how that category ties in with Tufte's principle and why it is important.

Overview

Initially, I included microscopic analyses of each of the 72 web sites, plus the 14 Ford sites in this and the following chapters in order to allow readers to see how the heuristics can be applied to a web site

and to demonstrate the validity of the heuristics. However, as the complexity (and the page count) grew, so did my understanding of what this thesis is really about.

While I still provide these details in the appendix for those who want more data and support, I found that what I really needed to explain is the basics behind how I developed these heuristics and what I learned from trying to apply them.

My first step was to read and re-read Tufte's books in order to develop a sound understanding of his principles and how he applies them to various mediums. Obviously, without a clear conception of these design principles, it would be impossible to make any meaningful contributions, relative to hypertext design, to Tufte's work. At the same time, I had to develop a strong background in the literary background of all the areas that the thesis covered.

While background research was extremely valuable for generating the purpose and goals of the thesis, I had to put those things into action in order to make the thesis viable. In order to develop a frame of reference for developing the heuristics, I had to identify patterns and structures already in place in web discourse. As an experienced web designer myself, I had several preconceived notions (all of which were demolished by what I learned from doing the thesis), but I needed some concrete examples to help backup (or disprove) those assumptions. Thus, I determined that I needed to run through a set of sites aimed at various cultures, created on behalf of one company, while keeping Tufte's principles in mind and making connections between the principles and the designs I saw.

Then, since I could not be certain whether what I saw was good or bad, I took those lessons learned and started to research what other designers and experts were saying about those items. So, not only was it important to validate my notions with other researchers in the field (as participants in this global web discourse), but it also helped me to quantify and qualify those categories so that they could be used like a set of heuristics.

The last step to the methodology was to take the heuristics and go through each web site and score it according to what I had developed. I used a few of Fords sites as "guinea pigs" for working out the bugs in the scoring system and for helping to make the heuristics clearer so that I could then have a group of people also use the heuristics independent of my observation and coaching.

Initial Evaluations

In order to determine how effective the application of Tufte's principles can be for web site analysis, I first looked at 14 of Ford Motor Company's international web sites. This analysis supplied several concrete examples of how each principle can be applied to a web page. I used a type of exegesis for this initial analysis, as described by M. A. K. Halliday: "One method of describing a text is by exegesis, or explication de texte, a kind of running commentary on the product that reveals something of its dynamic unfolding as a process" (Halliday and Hasan 11). This process is exactly what I needed to help me get a firmer grasp of the categories needed for the heuristics. In order to make this analysis more effective for creating the heuristics, I analyzed the Ford web sites for more cultures than just Mexico, Korea, and America. This helped to broaden the analysis and showed patterns and common designs across the sites.

In this section, I provide a short overview of what I learned from this initial analysis and how it informed the rest of the analyses. For the observations and comments for each of the reviewed sites, see Initial Ford Sites Evaluations in the Appendix.

At first look at the international pages that Ford offers users, it is obvious that the company is concerned about its world-wide image since almost every country is accounted for. In browsing through the sites, common templates and themes appear that seem to indicate several possibilities.

For the Africa and Korea sites, the designers merely provide contact information for a specific country or region. The sites look identical otherwise. However, the designers could have forced users through the American site instead of providing a slightly customized web site for these users. Perhaps there are few buyers in these countries, and so Ford has decided to spend web design budgets to entice existing customers of stronger "installed" bases. Presumably, the company has prioritized the list of countries and focused on those that would provide the highest return on investment for a designed web site.

For France, Germany, Spain, and the Netherlands, either the designers were the same people, or they used the same templates, modifying them slightly for each culture. While these templates are more involved than for Africa, and they all use the same site theme, they are each unique in their own ways. For example, the German site uses unique images on the opening splash page. After that page, though, the look and feel are basically the same as for the French site.

The rest of the sites that I evaluated were definitely unique. A few things did come through in these designs, though, that relate to Tufte's principles. It is apparent that navigation through each site is well thought out. The navigation is easy to find and use for almost all the sites. In fact, link navigation in general is important for each site. The sites make extensive use of links to provide multiple paths through the site so that users remain in control of their browsing experience. Repetition of graphics and icons is also common in the sites. This helps to tie the site together better than just the repetition of text. The visual repetition provides quick, almost subconscious, connections for the user because the user does not have to think about what they are doing or where they are in the site (or whether they linked to a different site). Thus, the cognitive overload is significantly reduced. Finally, while not all the sites kept their theme or site metaphor throughout all the pages of the site, it is obvious that the ones that do also help to lower cognitive overload. These sites are also easier to use and navigate because the user does not have to change their frame of reference every time that they access a new page.

In all, the Ford Motor Company does a fairly decent job of providing content that is designed for and targeted to a specific cultural audience. The sites that were designed for web use and interaction (such as America, Argentina, and Japan) seem to also have the most design points that coincide with Tufte's design principles. Even though some of the sites have not been optimized for the online medium, they still seem to have been designed in an attempt to meet the needs of the audience for which they were created. By analyzing this broad range of web sites, we see patterns of designs emerge that can be categorized into each of Tufte's principles.

Web Design Heuristics

These patterns and commonalities as discussed for the Ford sites can be generalized into design guidelines that fit nicely within the scope of Tufte's five principles of information design: micro/macro design, layering and separation, small multiples, color and information, and integrating text and graphics. In this section, I examine each principle, one at a time. I explore Tufte's comments on what each principle entails, and then what interface design guidelines instruct and how that corresponds to each of Tufte's principles.

Micro/Macro Design

The first of Tufte's principles is micro/macro design. This principle allows readers to "envision" the information and data easily and quickly. Of all the other principles, micro/macro seems to contain the most weight and bearing on the usability of data. When this principle is used effectively for design, more often then not, the rest of the design falls into place. According to Tufte, the main goals of this principle will allow the audience to do all of the following:

> Select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose, categorize, catalog, classify, refine, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, sort, pick over, group, pigeonhole, integrate, blend, average, filter, lump, skip, smooth, chunk, inspect, approximate, cluster, aggregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, list, glean, synopsize, winnow wheat from chaff, and separate the sheep from the goats. (Envisioning 50)

The main point of this long list is that micro/macro design helps the audience to understand complex, difficult, or unfamiliar information. Tufte states that, "The power of micro/macro designs holds for every type of data display as well as for topographic views and landscape panoramas" (Envisioning 38). So, although Tufte directs most of his commentary toward printed media, it is equally applicable for the Information Age's online media, where unfamiliar navigation schemes and "unique" designs can hinder the reader's goal.

One aspect of micro/macro design that Tufte espouses is to make judicious use of space. This is especially poignant on the Internet, where reading is more difficult, and long pages take longer to be downloaded for viewing. A highly condensed design helps readers to see the "big picture" of a site, as well as the small details that make the site what it is. Tufte writes that "High-density designs also allow viewers to select, to narrate, to recast and personalize data for their own uses. Thus control of information is given over to *viewers*" (Envisioning 50, Tufte's emphasis). One of the main purposes of micro/macro design is to let the audience take control of the data. They can best do this when space is used very efficiently and precisely. He adds, "*It is not how much empty space there is, but rather how it is used*" (Envisioning 50, Tufte's emphasis). The best use lets the audience compare data and make choices based on what they can

see at the same time. Thus, designs should keep everything within eyespan as much as possible. "If the visual task is contrast, comparison, and choice – as so often it is – then the more relevant information within eyespan, the better" (Envisioning 50). By following these guidelines, designers help their audience to understand and to make choices easier.

This same idea can be found in the guidelines of experienced designers. Jakob Nielsen has done a lot of research on web site usability, and found that "only 10% of users scroll beyond the information that is visible on the screen when a page comes up" (Alertbox, May 1996). So, many users base their decisions on what they can see on the first screen of a web page, especially on the first screen for the home page of the site. He also found through his research, that "reading from computer screens is about 25 percent slower than reading from paper" (Designing 101). Web users do not want to have to scroll or read lots of extra text on a web site, so the more concise the design is, the more the audience will enjoy the site. Mendelson suggests that designers should "try to keep [their] pages to two or three screens each. It's annoying to have to scroll down several screens. Treat the top of your page like the top fold of a newspaper and put the most important material above the fold" (Mendelson 1). In these cases, the most important information would be navigation for the site and any important company information.

For the site evaluations, I used a standard 800x600 pixel window size resolution to determine the number of screens needed for the main page of the site (the first page that a user would access). The sites with highly dense pages that did not need to be scrolled to view any essential information were easier to use and to get an idea of the scope of the site. They also seemed to be "designed" rather than just thrown together. The following table shows the scoring for the screen length of the main page. The value in parentheses under the Score value is a reminder to include the exact value for screen number in the scoring form.

Table 1. Average Screens for Main Page heuristic

Category	Score	Guidelines for Scoring
Avg. Scr/Main Page	1-10 (Integer)	1 6.1+ screens 2 5.1 - 6 screens 3 4.1 - 5 screens 4 3.1 - 4 screens 5 2.6 - 3 screens 6 2.1 - 2.5 screens 7 1.76 - 2 screens 8 1.6 - 1.75 screens 9 1.26 - 1.5 screens 10 1 - 1.25 screens

A design's use of space is tied with the design aspect related to page length. Tufte values designs that have lots of important detail and are condensed in a way that aids the reader to make easy comparisons, as in the Vietnam Memorial example. He writes that "high-density designs also allow viewers to select, to narrate, to recast and personalize data for their own uses" (Envisioning 50). For Tufte, density is synonymous with clarity. He also states, "*it is not how much empty space there is, but rather how it is used*" (Envisioning 50, Tufte's emphasis). Empty space can be valuable in layering and separating information, yet too much empty space can cause a distraction for the user, as well as hinder the user's attempts to understand the macro structure of a page. Space must be used efficiently and strategically so that it does not confuse or bother the reader. Thus, it is not just about the use of empty space that matters to Tufte, but the use of all available space. For Tufte, all designs must be dense. This does not mean that there cannot be unused white space or other stratifying elements, but it does indicate that designs need to "use" space and not merely let it exist.

Space use is a common theme with site designers as well. Although most site designers do not equate density with space usage, they do recognize that it is important to design pages so that the space is used effectively. It is commonly accepted that "reading from computer screens is about 25 percent slower than reading from paper" (Designing Web Usability 101). Since reading on a computer screen is harder, the effective use of space to organize the content and make it easier to use is quite important. This involves using more bulleted lists and "newspaper-style" writing that places important information at the top of the page, as well as creating short pages that are grouped according to similar content, as instructed by Lemay: "Try to organize your content into main topics or sections, chunking related information together under a single topic" (Teach 29). Designers do not give specific guidelines about how to use the space since every web page and every culture's expectations of space are different, but the common theme seems to be that information should be broken up into similar chunks and delivered in a way that the user can easily get the micro details without losing the macro structure of the page and the site. The following table shows the heuristic of space use in web design.

Table 2. Space Use heuristic

Category	Score	Guidelines for Scoring
Space Use	1-10	1 Too much blank space (important) 2 Too much blank space (unimportant) 3 Lots blank space, no org 4 Not very dense, somewhat confusing 5 Average use 6 Highly dense or too much space, very confusing 7 Somewhat dense, somewhat confusing 8 Somewhat dense, not confusing 9 Highly dense, somewhat confusing 10 Highly dense, not confusing

The next step in micro/macro design is to present the scope of the design effectively by giving an overview of the entire design (the macro portion of the principle). Much like the Vietnam War Memorial in Washington, D.C. gives an impression of vastness and unity in a broad view and provides finite details of individuals upon close inspection (Envisioning 43), so too should designs allow the audience to receive an overview of information, like a panorama, and help them understand complex concepts through the simplicity of its parts (Envisioning 38). Thus, when the micro parts of the site are designed so that the users can focus on each micro piece individually, while not losing track of the overall purpose of the site, users can use the site more effectively. Ironically, it is through adding detail that information is clarified.

Interface designers also understand the importance of giving the users a good overall impression and understanding of the site. It is important for web sites to involve the audience in the site by explicitly stating the site's purpose. This gives readers an overview of the site and helps them to determine what to expect from the site, as well as providing a general feeling for the overall design. Molly Holzschlag talks about how important it is to express your intent: "First determine your primary intent and then position it to your audience" (Holzschlag 30). Sites that do not have a specific purpose will be useless for users. Equally important is to actually "position" the intent with the users. This helps to establish trust between the user and the company who owns the web site. Lynn Shuler also emphasizes this principle for designers who use her web Design Checklist by having them question whether, "the purpose of the web material [is] clearly communicated" (Shuler 22). This intent needs to be tied into the site design. "To achieve this clarity, ensure that the language throughout your site is directed at the specific goal" (Shuler 32). All the elements of the site should help to strengthen and better define the goal of the site. Additionally, it is very helpful to have

this goal explicitly stated in the site so that users know better what to expect and what the designers expect of them. These guidelines help to generate the following table for heuristics.

Table 3. Site Purpose heuristic

Category	Score	Guidelines for Scoring
Site Purpose	1-10	1 Nowhere to be found 2 Linked to (or on main), but not avail. 3 Linked to (or on main), but bad 4 Linked to (or on main), inconsistent w/customer 5 Linked to (or on main), inconsistent with site design 6 Slightly inconsistent 7 Implicit in site (with theme, graphics) or on main 8 Good purpose but hard to find 9 Good purpose but somewhat hard to find 10 Stated explicitly

Another aspect of design that adds to the micro/macro structure is to create and consistently use an overall design. Tufte shows that a "consistent style" and a "universal theme" (Envisioning 37) help the user to see the macro structure of the site more easily. This in turn helps the user to more easily understand the micro details that make up the site. In these ways, the designer helps to blur the data so that users can see at multiple levels; they are able to make global and local comparisons (Envisioning 40). When users are able to make these types of comparisons, it is because the design does not interfere with the message of the design. Tufte explains that graphical displays need to "induce the viewer to think about the substance rather than about methodology, graphic design, the technology of graphic presentation, or something else" (Visual Display 13). The information on the web page and the design in general become more than just words and images. By adding multiple layers to the information, you strengthen the micro/macro design, as well as layering and separation design.

For web pages, this aspect of macro/micro design can take the form of the visual organization of pages in a site and the organization of information on each page. Viewers often determine the value of a site based on the overall design. This is the idea behind web page creation software, like Microsoft's FrontPage98, which allow designers to select from an assortment of themes that will then automatically be applied to all the web pages on the site. Laura Lemay, in Graphics and Web Page Design, urges designers to create a "story line" (Lemay, et al. 161) for web pages that establish a metaphor that everyone can identify with. However, this is not easy to accomplish. It takes a lot of work and effort. It takes being

grounded in universal images and ideas, and these images must be maintained throughout the entire web site. Refer to the following table for the heuristics related to consistency.

Table 4. Consistent Theme heuristic

Category	Score	Guidelines for Scoring
Consistent Theme	1-10	1 No theme 2 Theme inconsistent with purpose 3 Never consistent theme 4 On 1-2 pages consistent 5 On 3-4 pages consistent 6 Sometimes consistent 7 Often consistent 8 Always on main page 9 Always on main layers 10 Always

Although many designers and researchers suggest that there is a "problem of creating appropriate design metaphors" (Smith and Nelson 238), the reader will feel at greater ease within a web site if it seems familiar. The Yale Web Style Guide suggests that designers "incorporate visual and functional metaphors drawn from the world of everyday experience" (Yale) while others say designers should "use the metaphor of 'main roads' and 'scenic paths'" (Tilton, et al. 368). When designers use metaphors that are grounded in real life everyday experiences, the problems that are inherent to cross-cultural metaphors can be minimized. The Human Factors International (HFI) group also acknowledges that a consistent metaphor "can also set a common theme" (Schaffer 7-26). When a site has a common theme that permeates the site, the user can more easily identify with the site. Not only does the use of a site metaphor help users to understand the macro organization of the site better due to the consistent use of micro style elements, but also using a metaphor aids the designer in tying the site design with the purpose of the site.

This design must also be consistent in order to help readers through the site. This helps to alleviate the cognitive overload resulting from hypertext linking and from an unfamiliar site because a consistent site lets the user know that they are following the path that they intended and that they are where they want to be. In short, the user feels like they are in control of the site and their navigation through it. It is sometimes possible to change the theme slightly as the user goes deeper into the site's structure. This lets the reader know that they are getting more detail, or that the sections are slightly different. This idea can be found in designers suggestions that designers create sites with an overall design by "providing consistent page banners and by using a consistent style for a group of related pages" (Horton 440). Other designers

emphasize that it is important to design sites so that they are consistent. In "PC Magazine's Guide to Web Site Design," designers are encouraged to "achieve consistency in your web site design. Develop a common look and feel to your pages" (Mendelson). Laura Lemay acknowledges that a common look and feel is important because "consistent layout works . . . well in web pages" (Teach 305). Additionally, Eric Tilton sums it up by saying that "consistency is what brings your site together so that it becomes a cohesive whole" (Tilton, et al. 368). When a site's design is inconsistent or alters too much, the cognitive load on users becomes too much and they get frustrated with the site, moving on to another one. The following gives scoring guidelines for using consistent metaphors and keeping the site consistent.

Table 5. Consistent Site heuristic

Category	Score	Guidelines for Scoring
Consistent Site	1-10	1 No consistency, no purpose 2 No consistency, some purpose 3 No tied, bad purpose 4 Poorly tied, bad purpose 5 Tied, inconsistent with purpose 6 Some tying with purpose 7 Some tying, all purpose 8 Ties ok, all purpose 9 Ties well, all purpose 10 Highly consistent, all purpose

For Tufte, it is important that users easily get an overview of the site. He writes that this can be accomplished through panorama, vista, and prospect because they "deliver to viewers the freedom of choice that derives from an overview, a capacity to compare and sort through detail" (Envisioning 38). This macro detail lets users see the purpose of the site and get the overall impression of what the site is about. He also suggests that by "adding detail", information is clarified" (Envisioning 37). The micro details help to make data more easily understood and accessed.

Web designers suggest that detailed use of page titles helps to lead a user through a site, understand where they are in the site's structure, get a quick overview of that site's structure, and more easily return to the site when they create a bookmark for a specific page. Jakob Nielsen points out the important use of page titles as micro detail that adds to the macro structure: "A page title is microcontent and needs to be a pearl of clarity" (Designing 123). These words seem to mirror the ideas expressed by Tufte about clarifying by adding detail. He also suggests, "it is important to specify good page titles because the titles are often used as the main reference to the pages" (Designing 123). When a user makes a

bookmark to a page, the title is used as the text for the bookmark, thus the title is the main reference for the page. If the title is vague, users may not later remember what the bookmark was for, and may simply ignore (or even delete) it. Other designers recognized this as well when they teach: "your title should not only be descriptive, but understandable outside of context" (Tilton, et al. 30). This concept is reemphasized in discussions of narrative and travel, because the title links the page to a specific location. "The notion of a politics of location argues that identities are formed through an attachment to a specific site" (Kaplan 25). The best sites incorporate this design principle on every page and make each page title clear and descriptive so that users can more easily identify with the site and identify the page. The use of HTML frames complicates the issue somewhat since the title is always the title of the main frames page instead of the individual pages. However, bookmarking a framed page results in a bookmark for that specific page and not the main frames page. So, successful sites still give detailed titles to every page so that the user can maintain context and cognitive location with every page, as shown in the following table of heuristics.

Table 6. Page Titles heuristics

Category	Score	Guidelines for Scoring
Page Titles	1-10	1 None 2 Only on first page or poor 3 All same, frames 4 All same, no frames 5 Average naming 6 Good, bit confusing 7 Average naming, helpful 8 Good, helpful, no levels 9 Average naming, levels 10 Good, helpful, levels

Tufte encourages designers to allow viewers to see the structure of the site so that the user can take the information and use it how the user wants. Tufte wants designers to understand that doing this ensures that the "control of information is given over to *viewers*" (Envisioning 50, Tufte's emphasis). The viewer is the one who is using and accessing the information, so it is important that they have control of how they get the information. Another aspect of giving control of the system over to the user involves designing that system so that the design allows users to "select, to narrate, to recast and personalize data for their own uses" (Envisioning 50). Again, this design gives users control of the information, letting them use it in a way that fits their own particular needs.

Since users access the pages of a web site through some form of a navigation system, it is the navigation system that allows users to control how they access the site's information. "Web designers need to accommodate and support user-controlled navigation," (Designing 214) says Jakob Nielsen, because the user must be in charge of how they use a web site, otherwise they will simply leave the site and try another where they can explore how they want. "All hypertext systems permit the individual reader to choose his or her own center of investigation and experience. What this principle means in practice is that the reader is not locked into any kind of particular organization or hierarchy" (Landow 38). Users can and will use navigation to explore the Internet. The designer's job is to ensure that they use navigation included in the site instead of the browser's "Back" button to leave the web site.

The reader is helped when a site has consistent navigation structures and easy access to that structure. A consistent navigation structure is one that is repeated on every page that occurs at the same level in the site's hierarchy, and is modified only slightly (if at all) in deeper nodes within the site. This structure is carried through from the site's home page through to the deepest page in the site. Consistency in these cases involves similar (if not identical) wording, similar organization of the navigation links, and similar placement on each page. Even if these conditions are all met, the navigation structure can be useless for a reader if they are not able to easily get to or find the navigation links. For instance, if the user is at the end of a long page, they can more easily click the "Back" button of the web browser to return to the top of a previous page than to click the mouse several times before reaching the top of the current page. In these cases, the designer should consider whether it is valuable to put the navigation at the top and at the bottom of the page, or maybe a link that directs the user to the top of the current page. When designers take navigation into consideration when designing a site, they take the correct step towards giving users control of the site instead of trying to control the users themselves. The next table shows how navigation availability can be scored for a site based on how accessible the navigation is. Other heuristics, in Small Multiple design for example, focus on how the navigation is structured and how easy it is to use.

Table 7. Navigation Access heuristic

Category	Score	Guidelines for Scoring
Navigation Access	1-10	1 No navigation 2 Always must scroll or only first page 3 Always scroll, but at top and/or bottom 4 Mostly scroll in first layers 5 Only scroll in deep layers 6 Scroll occasionally 7 Sometimes scroll, but not distracting 8 Bigger screen would not scroll 9 In frame, but scroll 10 Never scroll

Another way to allow users the ability to customize the data involves an understanding of the multicultural nature of the Internet, and designing a multifunctioning site that is uniquely accessible for each user. Tufte also encourages designers to include "multifunctioning" information and graphics (Envisioning 47) that have meaning on several levels so that readers can get something new out of the site at each visit. According to Jakob Nielsen, "the ideal international user interface is one that is available in the user's preferred language" (International). One way to accommodate multicultural users is to design sites that communicate with a user in their preferred language and that are specifically tailored to that individual's culture. As shown previously, this was the case with many of Ford's international web sites, especially for those cultures that were a large market for Ford. Ford understands this principle and tried to give customers a culturally tailored experience, if desired, while always offering the option of viewing the data in a different language or for a different culture. These ideals provide the basis for the scoring for the rest of the micro/macro principles. However, I only used the Overall First Impression heuristic to see how closely I could determine the site's overall score on a first impression. This score is not used in determining the overall score; it is merely a barometer of how well the evaluator is analyzing the sites.

Table 8. Languages Available, Languages Separate, Overall First Impression heuristics

Category	Score	Guidelines for Scoring
Languages Available	2,4,6,8,10 (E English S Spanish K Korean C Chinese J Japanese O Other M Many)	2 Base language 4 Base + 1 language 6 Base + 2 language 8 Base + Many main language 10 Base + Many language

Category	Score	Guidelines for Scoring
Languages Separate	1-10	1 No language translation 2 No choice 3 Same page, just translated 4 Same page, links to each translation 5 Same page, somewhat different 6 Same page, very different, poor translation 7 Same page, very different, avg. translation 8 Diff. page, from first only, same look 9 Diff. page, from first only, diff. look (or diff, link, same) 10 Diff. page, link always, diff. look
Overall First Impression	1-10	1 No multiculture, no Tufte design 2 No multiculture, some Tufte 3 Some multiculture, little Tufte 4 No multiculture, lot Tufte 5 Some multiculture, some Tufte 6 Lots multiculture, little Tufte 7 Some multiculture, lots Tufte 8 Lots multiculture, some Tufte 9 Lots multiculture, lots Tufte 10 Perfect multiculture, perfect Tufte

When a designer incorporates principles from micro/macro design in a site, the user experiences a more accessible site that seems to be customized to their own preferences. Users find the information they need quicker and easier because they can navigate the site comfortably. The site seems familiar to users because it is consistent and uses metaphors that relate to the user's everyday life. These kinds of sites create a great first impression on users because they apply many kinds of multicultural design principles, including Tufte's principles, in a way that aids readers in finding information without any obstacles.

Layering and Separation

For Tufte, the various elements on a page must interact and create meaning through their association. This happens through layering and separation of data, where ordering, hierarchy, texture, shape, color, and size emphasize that data. Layering and separation is the creation of a visual ordering, emphasizing the important content through relationships. The use of this principle creates a visual hierarchy where the most important information is highlighted and emphasized.

Tufte suggests that designers separate layers by differing textures, weights, shapes, values, sizes, or colors. The choice is in how to let the various elements interact within a page so as to help the reader understand information. The layering and separating of data is very important for good design because

"confusion and clutter are failures of design" (Envisioning 53) and do not help the viewer to get the necessary information.

One aspect of layering and separation deals with how a design is organized. Tufte advises designers to show the "proper *relationship* among information layers" (Envisioning 54, Tufte's emphasis) so that the hierarchy of the design is evident to the user. When the organization is based on items that have no direct relevance to the user (for instance, ordering a catalog by item ID rather than by types of items) or in a way that the user cannot get a conceptual feel of the overall dimensions of the design, the cognitive load on the user becomes too much and the user gets easily lost in the structure.

In web sites, designers can alleviate this load by including a site map and a search function or index. This is especially true for large, complex sites. A site map is a graphical representation of the linking or organizational structure of a web site. The use of a site map helps the viewer see the site organization, go directly to pages of interest, and get an idea of what the entire site has to offer them. Tufte's words, "to clarify, add detail" (Envisioning 37) also apply to a site map, as well as a search or index: it must have sufficient detail and use effective design principles (the same principles that apply to regular pages – micro/macro, layering and separation, small multiples, color, and graphic and word integration). An effective search function allows users to enter their own words, yet performs the search as a natural language query, ranking the results by relevance. In this way, users can quickly learn the information they need. An index is merely a list of topics, alphabetically arranged in a way that helps the user find information quickly, from several possible locations. Typically, indexes are only used when the site does not employ a site map or a search function since indexes are more cumbersome to maintain and to access for users.

For the web, many analysts emphasize the need to create a "Table of Contents" page; a "What's New" page, and searchable indexes to make effective layers for a web site. Some write that designers should "provide access to a visual map of all pages at a site" (Lemay, et al. 27) and "if your site is complex, you may need an overview map" (Schaffer 5-15). Some designers point out that a site map is important because "if [your readers] cannot effectively use and navigate your infrastructure, they will not be able to use the information provided within it" (Tilton, et al. 97). This is the same conclusion that many designers come to regarding micro/macro design and the need to allow users to personalize the information. Research

on site use has also shown "that maps are the best way to convey a complex menu structure" (Schaffer 5-15). A good visual representation of a site's organization is better than a thousand words, as the old saying indicates. "Yet, if this statement is true, why does it have to be a saying? Because a picture is worth a thousand words only under special conditions – which commonly include a context of words in which the picture is set" (Ong 7). A site map can layer and separate the information and graphics so that users can view the entire site structure in a small space. Site maps, then, take on much of the design choices, advantages, and restrictions of topographic maps. "Whenever we divide our text into unitary topics and organize those units into a connected structure and whenever we conceive of this textual structure spatially as well as verbally, we are writing topographically" (Bolter in Delany and Landow 112). By giving users and dense and clear conception of the site's structure, designers help users to feel less confused about the cohesion and the connections between pages in the site.

However, a site map is not always enough to aid readers in finding the data that they want. Jakob Nielsen states, "My usability studies show that slightly more than half of all users are search-dominant" (Designing 224). This means that users predominantly want to use a search feature to find the relevant information. Most of this propensity is probably due to the poor navigation and site map options that most sites offer. However, it also may come from a desire to more quickly get to the heart of the desired information, rather than waste time trying to learn a new site's structure and style. This is the basis for Nielsen's article in 1996 that suggests for designers to "provide a site map and let users know where they are and where they can go. Also, you will need a good search feature since even the best navigation support will never be enough" ("Top Ten Mistakes"). It also underlies the instructions by other designers to provide a "full-text searchable index" (Tilton, et al. 377) since providing only an index that is manually generated by the designer based on supposed important words would be useless for most users. Manually generated indexes do not always account for each word or phrase that users are likely to enter since they are not dynamic. However, a search feature that indexes every word is useful because users do not need to guess what word used by the designer corresponds to the one that they want to learn about. A provided search feature, or at least an index, helps users to accomplish their tasks faster and more easily. The following table shows how to score these categories. The scoring guidelines are the same for each, so they are combined into one row in the table, but they account for two different scores.

Table 9. Site Map, Search or Index heuristics

Category	Score	Guidelines for Scoring
Site Map, Search or Index	1-10	1 None 2 Sparse, no links 3 Detailed, no links 4 Too complex (or not enough), disorganized, links 5 Too complex (or not enough), organized OK, links 6 Avg. ease, avg. detail, links 7 Easy to use, sparse, links 8 Avg. ease, detailed, links 9 Easy to use, avg. detail, links 10 Easy to use, detailed, links

Another application of layering and separation involves the use of backgrounds with designs. Tufte describes the importance of a good background in a design, "The various elements collected together on flatland *interact*" (Envisioning 53, italics in the original). It is important for a design to use a simple background, otherwise the content can easily get lost in the clutter of a busy background. There should be a high contrast between the data and the background. The background used needs to allow the user to concentrate on the data rather than the design or the containers (Envisioning 64). Background "noise" confuses the layers and distracts from the content of a design. For Tufte, the background is anything that "separates and layers information by means of distinctions in shape, value (light to dark), size, and especially color" (Envisioning 58). The background supports the data and helps to organize it for greater accessibility by supporting the user's goals and needs.

Background usage is often a topic of discussion among design professionals. Laura Lemay encourages designers to "put your web page on a neat background . . . .as in uncomplicated" (Lemay, et al. 45). She points out that overbearing backgrounds can distract from a page's message and make the page seem cluttered. The human-factor professionals at HFI also teach that "strong backgrounds make reading difficult" (Schaffer 11-1) for users because it becomes harder for users to make out similar-looking letters like "l" and "I" or "O" and "D", and they easily miss ascenders and descenders on letters like "d" and "p". Jakob Nielsen suggests that designers "use either plain-color backgrounds or extremely subtle background patterns" (Designing 126). Although these designers suggest plain-colored backgrounds as the "standard", they also understand that background patterns (like a subtle company logo image) and using multiple backgrounds for different functional areas of a web page and site, can all further the usability of a web site. However, all the designers agree that a plain gray background is not user-friendly because it is the default

color background that is used when a designer does not specify a specific background. When a page uses a gray background, it seems to indicate that the designer was lazy and did not even consider the background in the design. The scoring guidelines for background use are in the following table.

Table 10. Simple Background heuristic

Category	Score	Guidelines for Scoring
Simple Background	1-10	1 Cluttered, no/little contrast 2 Cluttered, avg. contrast 3 Cluttered, high contrast 4 Default gray 5 Average, no (or little) contrast 6 Simple, no (or little) contrast 7 Average, average contrast 8 Average, high contrast 9 Simple, avg. contrast 10 Simple, high contrast, focus on words

Designers also need to consider the placement of information on each page of a design. The most important information should be placed at the top of the page, or in some other prominent location. Studies have indicated that users typically scan a design from left to right and top to bottom (except for some audiences whose native languages are read right to left). Additionally, users often scan left to right across the top, then down the right side of the design to the lower right corner (Schaffer 10-5). The increasing use of advertisements in these specific areas shows that some marketing and advertising agencies agree with this. However, since these advertisements usually annoy readers, the readers simply move their scan zone a little further down and to the left so they can find the important content. The order of information placement is an important part of layering. Tufte tells designers to pay attention to what comes first on a page, because that is what users will see first (Envisioning 55). He also emphasizes that designers should not only be concerned with the data at the start of a design, but also with what they end their design with. His principles tie into the results of the previously mentioned research since users often scan from the top to the bottom of information with little regard for the center content until they determine if the data is relevant to their specific task at the time. These guidelines may contradict the reading patterns of some cultures (those who read right to left and/or bottom to top), and so need to be taken with an understanding of audience. The designer is ultimately responsible, according to this category principle, for putting the most important information, like navigation, in the reader's initial and final scan zones, whether those are top left and lower right for American and other cultures or some other combinations based on user testing

and research for that culture. The design needs to guide the user's eyes through all the important information so that the user can see everything they need in one glance.

Web designers have long understood that the organization of data on a web page is important, even if they didn't know about the results of scientists' research or the design principle that Tufte discusses. Larry Lin suggests that the most important stuff be put near the top of a web page (Lin 1), and HFI also echoes this belief: "Put as much as possible into the top of the page" (Schaffer 10-16). By placing the important information in the top left and the lower right corners, readers will be able to scan documents easier for information. If a page is not designed to accommodate this kind of scanning, users will have trouble using the design. "If you violate the user's normal scanning pattern, confusion will generally result" (Schaffer 10-6). Laura Lemay further reminds readers: "most users have been conditioned to look for main navigation items at either the top or bottom of the page" (Lemay, et al. 31), while Jakob Nielsen writes, "All critical content and navigational options should be on the top part of the page" ("Top Ten Mistakes"). Implicit in Lemay's and in Nielsen's instructions is the idea that navigation is one of the most important aspects of a web site (and thus needs to be displayed in prominent places on the page) and it is often used by users as a kind of generic overview to determine if the site contains the kind of information that they need and if it is relevant. The following heuristics provide guidance on how to score placement of information.

Table 11. Important Information First heuristic

Category	Score	Guidelines for Scoring
Important Info First (top left, lower right)	1-10	1 Never main, never others 2 Never main, some others 3 Some main, never others 4 Always main, never others 5 Average main, poor others 6 Average main, good others 7 Sometimes main, some others 8 Sometimes main, always others 9 Always main, some others 10 Always main, always others

Aside from navigation items, users often use intra-content headings to scan data and to determine what they want to read more about. Tufte teaches that designers need to maintain a "proper *relationship* among information layers" (Envisioning 54, Tufte's emphasis). The proper relationship also needs to be included within a site's headings, so that readers can easily see the different layers of the content and what

subheadings belong with which parent heading. Headings also serve to separate the data into coherent groups. The instructions for background design apply equally well to heading design: "[Separate] and [layer] information by means of distinctions in shape, value (light to dark), size, and especially color" (Envisioning 58). Designers need to carefully choose heading designs that guide users down into the content structure by giving the greatest emphasis the most general headings, and lessening the emphasis for lower levels. When this design principle is used well, users can easily distinguish the various levels of headings, even across different pages or separated parts of a design.

Headings need to show levels so that users can quickly get a feel for where they are in the structure of a web site. Jakob Nielsen points out, "users scan text and pick out keywords, sentences, and paragraphs of interest, while skipping over those parts of the text that they care less about" (Designing 104). Headings are one of the main methods that readers use to scan information. Headings that are meaningful and that break up long textual passages into bite-size chunks are best for this task. Nielsen suggests, "structure articles with two, even three, levels of headlines" (Designing 104). Creating these types of structures helps readers to get to the information they need as well as understand their orientation in the site. "One of the most commonly used of such orientation devices is the header icon, which immediately informs the reader that a lexia belongs to a particular web or subweb" (Landow 144-145). Of course, this is only valid when the header icon is designed in such a way as to indicate that it belongs with the other parts of the site or subsection of the site. Other designers point out that "it is important to remember that the purpose of . . . headers is . . . to organize a document into sections" (Tilton, et al. 346). Headings help to create structure and to organize the information into useful blocks. It is especially important to break up data into chunks when you expect users to make some kind of decision or to complete a set of steps. "Keep things clean and break them up into small sections of precise communication" (Holzschlag 32). Creating white space or separation in the design reduces the possible cognitive load because the data does not seem to be as overwhelming. This is the reasoning behind the suggestion to "break a complex activity down into small, manageable steps (Schaffer 9-1). It is easier for readers to find information and to manage that information if designers use meaningful headings to break up text so it is less intimidating and unwieldy. The following table shows the scoring breakdown for heading use.

Table 12. Use of Headings heuristic

Category	Score	Guidelines for Scoring
Use of Headings	1-10	1 None used 2 Only 1 used for all, all same page 3 Only 1, some same page 4 Only 1 level, different pages 5 Multiple levels, no distinguish 6 Few levels, no distinguish 7 Few levels, avg. distinguish 8 Few levels, easy distinguish 9 Multiple levels, avg. distinguish 10 Multiple levels, easy to distinguish

Headings are only one type of element that helps to create "chunks" of information. Tufte describes ways of visually arranging information so that more important data is emphasized over less important data (Envisioning 58). This arrangement necessitates that data be placed in relation to other similar data. Doing this arrangement forces designers to only use data that is relevant – extemporaneous data must be left out – since irrelevant data detracts from the usefulness of wherever it is in an information chunk. These useful chunks must then be organized into a hierarchy with headings, and separated into easily identifiable areas of information.

Web designers also support information chunking. Chunking is the idea behind suggestions by Lemay and others to break up information into groups by using headings, lists, horizontal lines, breaks, and graphics. Theresa Wilkinson defines web site architecture as "laying out or grouping any similar areas in a web site" (Wilkinson 37). Lists, lines, and other elements are the containers that support the data. Tufte warns that these kinds of devices need to allow the viewer to concentrate on the data rather than on the containers (Envisioning 64). The text itself also needs to be designed into chunks. Laura Lemay seconds this idea, "try to organize your content into main topics or sections, chunking related information together under a single topic" (Teach 29). Researchers like Ben Shneiderman have also shown this idea to be valid: "Research suggests that many short documents are preferable to a smaller number of long documents" (Barrett 126). When a design breaks up its data into chunks of information that are separated and useful, readers can easily find and use the data however they need. The chunking scoring guidelines are contained in the following table.

Table 13. Chunking heuristic

Category	Score	Guidelines for Scoring
Chunking	1-10	1 No chunking at all 2 Average, poor, (not) separate 3 Average, good, not separate 4 Average, good, separate 5 Lots (or enough), poor, not separate 6 Lots (or enough), average, not separate 7 Lots (or enough), poor, separate 8 Lots, good, not separated 9 Lots, average, separate 10 Lots, good, separate

The data in a design creates a visual hierarchy that guides viewers through important information, while still allowing them to pick their own path through the design. Designers can accomplish this in many ways. Tufte describes "*small spots of intense, saturated color*" (Envisioning 63, Tufte's emphasis) that help to provide information to viewers because they draw the eye and serve to separate the data from other chunks of the design. However, he also warns that too many spots and lines create confusion because "the noise of 1+1=3 is directly proportional to the contrast in value (light/dark) between figure and ground" (Envisioning 62). The separation mechanism must not distract or overpower the data that it is trying to emphasize. The use of containers that use lines or color to create layers and separation is sometimes too easy and a design can be easily overloaded. Designers must use discretion and restraint when choosing the types and amount of "visually stratifying" (Zimmerman 311) elements so that the reader can find the data without noticing, or at least being distracted by, the containers.

As with the discretionary use of headings, design elements like horizontal rules, frames, or tables can emphasize data by separating and layering it against other elements in the web page. Nielsen comments about design elements that help to separate data: "Bulleted lists and similar design elements should be used to break the flow of uniform text blocks" (Designing 106). Nielsen's studies have shown that breaking up text into smaller chunks that are separated by space, or bullets, or horizontal or vertical lines, allows readers to concentrate on their tasks more because they can scan and find what they need better and quicker. Horton and other authors have suggested that designers should break up web pages into manageable chunks or distinct areas using swashes, rules, and line breaks because they make navigation and reading more predictable (Horton, et al. 405). Many studies have shown that online reading is much slower (around 25% slower according to some) and more cumbersome for people. When information is broken up in these

ways, readers don't have to worry as much about reading – they can focus on gleaning the data that is important for them at the time. This type of layering, as well as all the other aspects that designers suggest, helps the reader to get the overall picture of how the site is set up and then how they can interact with it. The following table provides guidelines for scoring line use and design.

Table 14. Use of Horizontal Rules heuristic

Category	Score	Guidelines for Scoring
Use of Horizontal Rules (or Frames, Tables)	1-10	1 Not used 2 Used very little 3 Distracting, haphazard 4 Not distracting, haphazard, no reason 5 Distracting, some reason 6 Distracting, good reason 7 Some, some with headings 8 Often, some with headings 9 Sometimes, always with headings 10 Often, with headings

Small Multiples

Defined as data-thick "slices" of information that offer variations on a major theme, small multiples are repeated graphics that either intensify similarities, or illuminate the differences. This is like the frames of a movie, which vary only slightly between themselves, but which allow for easier recognition of the differences (Envisioning 67). This allows readers to compare changes, see differences, and view alternatives. By keeping the frame relatively consistent, the designer allows the reader to recognize the differences in data above the differences in design (Visual Display 170). The use of small multiples within a design helps users to make comparisons between choices and to understand the design quicker. The comparisons are enhanced when the design elements occur "within the scope of the eyespan" (Envisioning 76) and use positioning, orientation, layering, and similarities.

Small multiples can serve many functions in a design. They are especially good at showing small differences for decision-making. When used in this way, small multiples "[visually enforce] comparisons of changes, of the differences among objects, of the scope of alternatives" (Envisioning 67). Thus, a broad range of alternatives can be presented in a way that highlights the differences and allows for effective decision-making. In order to accomplish this in the best possible way, the small multiples must be well thought out and well designed. Tufte writes:

> Well designed small multiples are inevitably comparative; deftly multivariate; shrunken, high-density graphics; usually based on a large data matrix; drawn almost entirely with data-ink; efficient in interpretation; often narrative in content; showing shifts in the relationship between variables as the index variable changes (thereby revealing interaction or multiplicative effects). (Visual Display 175)

According to Tufte, small multiples fill many roles in the design and in the interpretation process. As a result, they must be developed so that they are specific to their data while being universal in interpretation. Tufte suggests that this is possible when the small multiple is based on a rich section of data from which users can draw. When data is the source, then it is not as easy for a viewer to misunderstand the data or the differences between each small multiple.

The ability to create a design that shows similarities and differences at a glance is an important characteristic to develop for any web designer. Web page design guides follow this principle by suggesting the repetition of icons, symbols, and menus. These things help the user get through the different parts of the site, but they also give the user a sense of control, which is greatly needed in the abstract space of the Internet. Researchers studied how users explored an early hypertext system, and found that "the most important function of the eight buttons at the bottom of the screen is to give the user the feeling that she is completely in control of the program" (Nolthuis 83). When users feel in control of a site because of good navigation, the cognitive loads generated by hypertext linking and in exploring unfamiliar areas are diminished because the user has a "base of operations" through the consistent navigation and graphics. Because of this, the user should always have easy access to the navigation. Ideally, this would be available without any scrolling or over-use of the mouse (at most, one or maybe two scrolls or clicks would be acceptable on pages deep in the site, but not on the main pages). The user should also be able to compare and contrast the small multiple navigation elements without having to scroll. The elements should all appear within a single screen of a web page so that they are within "eyespan" of each other (Envisioning 76).

Another way to enable small multiples through navigation is to allow multiple paths through a site's structure. So, instead of a designer creating a site that channels users through a specific set of web pages, the user is allowed to go to any page, in any order. This also gives the user a sense of control, and

makes the site seem more interactive. Web designers often admonish other designers to use repeated navigation devices, placed close together, to help the user make their way through the web site hierarchy. According to research data on online shoppers, "bad site navigation is by far the leading cause of buying dissatisfaction. Poor navigation drives 40% of potential repeat buyers away" (Rhoda 1). Proper navigation is one of the most important elements on a web page. If users have trouble getting around a site, they will often just move on to the next web site, rather than try to figure it out on their own. The experts at HFI point out that "the user MUST be able to discriminate between menu choices" (Schaffer 7-7, Schaffer's emphasis). The ability to easily choose between menu items is central to the idea of small multiples. The more that users have to guess or think about choices, the more likely they are to leave the site. Additionally, HFI teaches designers: "If you create a menu, the first question is: 'Can the user tell which selection to make?'" (Schaffer 7-7). Menus and navigation aid the reader in exploring a web site. But when the elements are vague or do not provide enough information for users to discriminate between the small multiples, the user can easily get lost and frustrated. It is important for designers to keep the following information from Philip Rubens in mind when developing navigation and linking structures:

> First, any links provided by the developer must describe an error-free path for the program to follow. Second, the links must be capable of quickly transporting the user to useful information. Third, some indication of the relationships among parents, sibling, and context-sensitive information must be established for the user. (Barrett 17)

The controls must be clear and give enough information so that the link creates a cohesive tie between the two documents. These ideals contribute to the scoring guidelines for the User Controls Used category.

Table 15. User Controls Used heuristic

Category	Score	Guidelines for Scoring
User Controls Used (nav bar, links, multiple paths, other)	1-10	1 No user control allowed 2 Average access, no paths, few links 3 Average access, no paths, multiple links 4 Poor access, few paths, few links 5 Poor access, few paths, multiple links 6 Average access, few paths, few links 7 Avg. access, few paths, multiple links 8 Easy access, mult. paths, only from start 9 Easy access, mult. paths, mainly start 10 Easy access, mult. paths, mult. Links

Associated with navigation is the idea of a default next move in going from one piece of data to the next. The arrangement of small multiples in close proximity to each other, and in ways that the viewer can easily discern from the rest of the content can help in this process. Tufte writes, "Small multiples are economical: once viewers understand the design of one slice, they have immediate access to the data in all the other slices" (Visual Display 42). The arrangement should guide the viewer, help the viewer make informed decisions, and show the data behind each multiple once the data for one is seen or understood. Tufte emphasizes the importance of positioning: "Connections are built among images by position, orientation, overlap, synchronization, and similarities in content" (Visual Explanations 82). When a design shows the reader the connections instead of making the reader figure them out on their own, the design is much more usable and useful because it doesn't take a lot of effort or help to understand the design. However, this is only possible when the viewer's expectations are met and reinforced consistently across the design.

It is also possible to meet users' expectations in web site design. As a first step toward this goal, Lemay suggests to "design a graphical element that represents your web site" (Lemay, et al. 28), like a logo or special navigation icons, and put it in the same place on every page so readers know that they are still within your web site, and to maintain a consistent design. When the user knows where to expect a design element, they feel better about the site and about their control of it. "Conklin (1987) described two components of navigational difficulty that he believed may ultimately limit the usefulness of hypertext: disorientation and cognitive overhead" (Gray 84). Disorientation occurs when the user has trouble knowing where they are in a site's structure, and cognitive overhead is heightened with the need to keep track of the contents as well as linking of hypertext documents. Brenda Laurel, Tim Oren, and Abbe Don discuss ways to diminish this problem: "One way that [minimizing cognitive load] is accomplished . . . is by automatic generation and presentation of a restricted, ranked sublist of the connections available from any text article. The head of the list is presented as a default 'new move' option, creating the possibility of moving through the database by repetitively clicking at a single location" (Laurel 62). If the organization or placement of items differs from page to page, the user will not be able to develop a rhythm for moving between pages, and they will lose the context of the data by continually having to search for navigational pointers. Other designers also point this out: "To reduce motor load, reduce the number of keystrokes and switching

between keyboard and mouse" (Schaffer 9-1). When users have to do too much to extract data from a site, they feel like the site is less useful, even if the site contained all the information that they wanted. This is because they lose track of all the data when they have to constantly think about navigation and where to go next. It is much better to set up the design so that the user does not have to move the mouse pointer very far to continue through the site, so they can focus on the data and subconsciously navigate the site. It is important for the navigation to be "transparent" to the user so that that user does not have to think about how to use the navigation and can instead focus on the content and on getting to the information that user needs. This is also emphasized by the researchers at HFI when they claim that "scrolling is hard" and to "never force your user through a single extra scroll" (Schaffer 10-16). It is not that scrolling is physically demanding or that users will not scroll, but that they want to get to where they need to go without too much thought or interference. The best designs are those that allow a user to navigate through them without having to think about what they are doing – the directions are explicit, without being restrictive – and allowing them full control of the site and its data. The following table shows how these ideas have been combined into one category.

Table 16. Default New Move heuristic

Category	Score	Guidelines for Scoring
Default New Move (minimize mouse)	1-10	1 Never 2 Little, average confusing 3 Little, little confusing 4 Little 5 Sometimes, little confusing 6 Sometimes 7 Often, little confusing 8 Always, little confusing 9 Often 10 Always

Well-developed navigation structures guide the reader through a site, but there are many other kinds of small multiple elements that should be used in conjunction with this navigation to help the viewer. In discussing small multiples, Tufte explains that they are repeated or juxtaposed images that allow users to make comparisons and see alternatives (Envisioning 67). I have already discussed how useful it is to place small multiples in close relation to each other, but here, Tufte also indicates how important it is to place the images in similar places across the design. Doing this allows viewers to see "shifts in the relationship between variables as the index variable changes" (Visual Display 175). Consistency helps the viewer to

create expectations, but it also emphasizes the differences when they do occur. The differences can occur in color, size, shape, position, layering, or any other design tool that allows for similarities or differences to be made apparent.

Another way that web designers can create small multiples in their design to help users is to repeat a banner graphic, a company logo, icons and other graphics, and navigational graphics. These repeated small multiples should stay in the same general area on a page, and should look the same, or nearly the same, on each page in order for the small multiple effect to work across multiple pages. When these things occur on the same page, variations are easier to spot and understand. The experts at IBM suggest that designers "establish a visual identity by using related visual elements throughout your site. A consistent visual style gives a site a sense of unity and reinforces users' experience that they are rooted in a certain place" (IBM 1). Consistency aids in branding the site for users, and lets the viewer know whether a link has taken them away from the web site or not. A small, repeated logo, color scheme, and page background help to add unity and coherence. The Sun web site suggests that designers "reuse graphics" (Sun) to help orient readers and help them find out where they are in a site. Other designers also make this suggestion: "A standard repeated site-wide graphical banner or text-based header can be used to easily identify the site" (Tilton, et al. 369). The use of a corporate logo as a small multiple is a great way to help users identify which site they are using, even when they are deep in the site. It can be used as a point of reference, a type of homing beacon for when they get confused or want to explore other routes. Indeed, this logo can often be used as a link that takes the user to the home page of the site. In any case, all the logos, banners, navigation icons, and other design elements should be designed to fit together: "Design a graphical element that represents your web site" (Lemay, et al. 28). The graphics should represent how the designer wants the audience to experience the web site: if the site is informal, then graphics can be entertaining and cartoon-ish, but if the design needs to portray a more formal image, the design should support this with professional graphics and polished images. The following table shows the same scoring system for these various categories, which account for four separate scores.

Table 17. Repeated Banner, Repeated Logo, Repeated Icons, Repeated Navigation heuristics

Category	Score	Guidelines for Scoring
- Repeated Banner - Repeated Logo - Repeated Icons (buttons) - Repeated Nav Devices (stay same look, place)	1-10	1 Not used 2 Not repeated 3 Some repeat, different look 4 Often repeat, different look 5 Lots repeat, different look 6 Some repeat, same look 7 Often repeat, sort of same look (or always, diff) 8 Often repeat, same look 9 Always repeat, sort of same look 10 Always repeat, same look

In general, graphics and color schemes need to remain consistent throughout the site in order to achieve the small multiples design effect. Any changes should be limited, small, and easy to pick out so that the appropriate comparisons can be made. They should also only be done when needed to highlight a key point or change in the site or design. Schaffer and his colleagues discuss the importance of keeping the various components of a site consistent: "Components ensure common navigation, theme" (Schaffer 7-26). Consistent graphics and a consistent "design look" support the user as they link from one topic to another. The consistency allows for users to get around easier, and quicker, which is one of the most important things for a web browser to be able to do because they typically feel that they are in a hurry and don't have time to learn a site. It needs to be consistent and predictable so that users "get" it without having to expend lots of time or energy. Other designers also repeat this mantra when they suggest that web sites should have a repeated logo or icon as well as a repeated page background and color scheme (Tilton, et al. 369). The idea is brought up in other contexts as well, such as when Lemay and coauthors suggest that designers need to be "designing graphical elements of the same color" (Lemay, et al. 28). The graphical components need to be consistent in placement and in how they look, but they also need to maintain a consistent color scheme, or else users will interpret the change as being significant because of the small multiple effect. The following table shows how to apply these ideas to a heuristic.

Table 18. Consistent Graphics and Color Scheme heuristic

Category	Score	Guidelines for Scoring
Consistent Graphics (look alike) and Color Scheme	1-10	1 Not used 2 Some consistent, no distinguish 3 Some consistent, average 4 Some consistent, good distinguish 5 Mostly consistent, no distinguish 6 Mostly consistent, avg. distinguish 7 Always consistent, no distinguish 8 Mostly consistent, good distinguish 9 Always consistent, average distinguish 10 Always consistent, easy distinguish

Any changes from the design of a site force the user to spend time contemplating what the difference is and why it is a difference. Random changes only frustrate, or worse, mislead, users, and it wastes their precious time. But, when relevant changes are made to an area of a design that also make it obvious what the changes represent by allowing the viewer to make comparisons and connections, the small multiples add to the meaning of a site – creating multiple levels – and direct the user to the information that they need.

Color and Information

Tufte's next principle of information design revolves around the use of color. Color can be an effective tool for a designer, but it can also be used to the detriment of a design. Specifically, Tufte focuses on how color and information are tied together and how the proper use of color in a design can help the viewer to understand and interpret that data. Although the use of color may seem simple, it is not so easy to use it in a meaningful and effective manner.

Tufte warns designers that color placement and use are not as simple as they appear to be. For Tufte, restraint is the key. "Putting a good color in a good place is a complex matter. Indeed, so difficult and subtle that avoiding catastrophe becomes the first principle in bringing color to information: *Above all, do no harm*" (Envisioning 81, Tufte's emphasis). This approach echoes the sentiments of Furrow and others in discussions about ethical interaction. He then goes on to explain how the overuse of color is detrimental to a design. Color should only be used where it is expressly needed to emphasize or define parts of the design. It should be used sparingly, in "spots", and to define lines and edges. According to Tufte, color has some fundamental uses: "*To label* (color as noun), *to measure* (color as quantity), *to represent or imitate reality* (color as representation), *to enliven or decorate* (color as beauty)" (Envisioning 81, Tufte's

emphasis). And, even when a design calls for such a use, color should not be thrown into the design without consideration. However, when used correctly, Tufte writes that "extraordinary effects can be achieved when [colors] are used sparingly" (Envisioning 82). Designers can aid a design with the judicious use of a limited set of colors in limited circumstances.

For web design guides, restraint is also the key. Most suggest that strong colors should be used sparingly and mostly to draw the reader's attention. Lemay even goes as far as to suggest that designers use mostly black and white graphics, where "judicious use of grays can be almost as effective as color for making visual discriminations" (Lemay, et al. 51). While designers may differ slightly in their recommendations for how much color and where it can best be used, they all agree that "less is more" because too much color makes the design cluttered and uninviting. The idea of maintaining an uncluttered document inspires this design guide suggestion: "Use graphics to add flavor to your work and not be the main ingredient" (Imagineaider). A byproduct of limiting the number of graphics and colors in the graphics is that pages will load faster because the number of bytes that must be transferred is smaller. Researchers at HFI warn designers: "Don't use too many colors" (Schaffer 11-1). Through research, they found that too much color was a distraction and worsened user's performance in tasks. Roger Grice also found this to be true: "But use, actually misuse, of color can be a distraction, and the color may get in the way of use and understanding" (Grice 41). Of course, when a design gets in the way of a user's task, the user is more easily frustrated and more likely to leave the site. Researchers have found, however, that using even "one color code improves performance" (Schaffer 11-5) over not using any colors and that the "break even point is about 6 colors" (Schaffer 11-5). In evaluating the web pages discussed in this thesis, I counted the average number of colors per web page and scored each site on the average across most of its pages. The best sites used color consistently and stayed around 6-9 different colors or uses or colors. Although the use of more colors than this did not necessarily constitute a poor design, the better designs only used more colors when it was obviously needed to signify a difference or to affect the presentation so that a specific, needed piece of data was highlighted. These guidelines account for the following scoring system.

Table 19. Average Number of Colors heuristic

Category	Score	Guidelines for Scoring
Avg. # Colors (text, buttons, graphics, icons)	2,4,6,8,10 (Integer)	2 30+ colors (or 1 color) 4 20-30 or 2-3 colors 6 15-19 or 4-5 colors 8 10-14 colors 10 6-9 colors

The number of colors used also relates directly to how they are used. Tufte's fundamentals of using color to label, measure, represent, and enliven are key points in discovering how well a site uses color. When a design seems to use color in various ways for all of these points, it shows that the designer understands the importance of color and its effectiveness, while also being aware of the potential for misuse. These designs do not have haphazard use of color like the designs that employ none or only a single aspect of these fundamentals. These designers understand that "Color is usually bad. It can degrade performance" (Schaffer 11-1). Color draws attention to itself, to the exclusion of other data and design points. But, these designers also know that "Color can be good. People like it and it CAN aid performance" (Schaffer 11-1, Schaffer's emphasis). Color use is effective when it has a purpose, especially when that purpose is obvious or can be easily inferred. Color "adds aesthetic appeal, adds realism, adds 'excitement', provides meaningful codes, aids scanning, shows relationship, draws attention" (Schaffer 11-2). These points coincide nicely with Tufte's fundamental keys for color use, and help in scoring for the next categories. These points also direct attention toward Tufte's other principles of design, and suggest that color is an important component of micro/macro design, layering and separation, small multiples, and the integration of text and graphics.

As mentioned before, color is an effective design tool because it draws the viewer's eyes. The human eye is trained to quickly detect color changes, even peripherally. When the eye detects a "new" color in the field of vision, it automatically focuses on that color to determine its origin and purpose. Thus, color can be used to draw the viewer's attention. But, if this is done too much, the viewer feels like they are being pulled in multiple directions and become confused and overwhelmed. Colors should always be used for the same purposes across all pages in a site. Not only does this play into the small multiples effect, but it also makes it easier for the user to figure out what the page is about. This is also the reason behind the ease and popularity of hypertext linking on the Internet. Links are typically underlined and colored blue when a user first accesses a web page. Then, as each link is explored, the links' color becomes purple. This simple

convention allows users to effectively navigate a site by following links that indicate, by their color, if the user has already tried that path. This also shows why many designers and users react so strongly against sites that define a different link color than blue and purple. Web designers consistently preach that color use must be consistent. In HTML 4 Unleashed, the authors write, "As with menu elements, be consistent with the use of color throughout your site" (Darnell 150). Just as I discussed with small multiples, navigation and other elements must be consistent. Color can be used to highlight subtle changes in navigation, like when the user is deep in the site structure rather than the home page, but generally it is more useful to keep design elements the same color throughout the entire site. Lemay also adds that "designing graphic elements of the same color" (Lemay, et al. 28) helps to create unity and cohesion as well as effectively labeling the various sections in a site. Thus, color helps enhance the message and the medium to aid the reader in understanding the content, as in the following scoring heuristics.

Table 20. Consistent Color Use, Color Use heuristics

Category	Score	Guidelines for Scoring
Consistent Color Use	1-10	1 Not used 2 Never consistent, too many colors 3 Never consistent, some colors 4 Some consistent 5 Mostly consistent, too many colors 6 Mostly consistent, average use 7 Always consistent, too many colors 8 Mostly consistent, good use of colors 9 Always consistent, average use of colors 10 Always consistent, good use of colors
Color Use	2,4,6,8,10 (L Label M Measure (quantity) R Reality E Enliven (beauty))	2 No uses 4 1 Use 6 2 Uses 8 3 Uses 10 4 Uses

In the previous discussion on the use of backgrounds as an aspect of layering and separation, we left off discussion of how color ties into the creation of an effective background. In the previous section, we learned that backgrounds need to be simple and uncluttered. However, this does not mean that they need to be only white or static. To soften the bright white backgrounds of computer screens, Tufte suggests the use of earth tones, which will also help to define lines and edges better. The reason that earth tones should be used, according to Tufte, is because "Nature's colors are familiar and coherent" (Envisioning 90). Additionally, when talking of using spots of bright colors, he warns that a dull or light gray background

should be used, so as not to detract from the content (Envisioning 83). Once a background color has been chosen, the designer must consider what color text to employ. The designer should choose a color that contrasts well with the background. Tufte suggests that the equation of Background + Text = Readability represents the importance of using highly contrasting colors for text and background. "Color defines edges and allows a simple and elegant *de-gridded* design" (Envisioning 89, Tufte's emphasis). Color defines edges of tables, columns, graphics, and text so that the lines can be more easily seen. In fact, as in the previous quote, color can often be used in the place of other lines or divisional elements. Obviously, when the text, or data, is obscured or unreadable because the background is too strong, the purpose of the design is compromised.

In web site design, one of the first considerations is often what background and text colors to choose from. Kaye Vivian tells designers that, "if you want to use backgrounds, be sure the texture or pattern is subtle so it doesn't compete visually with your words. Solid, pale colors are best, with black or very dark type" (Web Writing). Here, Vivian assumes that background means texture or picture, since that is how the tag is defined in HTML. However, other designers equal background with the part of a design that supports the data and structures it. Jakob Nielsen admonishes designers to "use colors with high contrast between the text and the background" (Designing 125). Other designers echo this statement: "If you choose to use colored text, make sure it contrasts well with its background for easy readability" (Darnell 151). Many designers also explicitly talk about using reds and blues together on a page. Although they may seem contrastive, red and blue together is an extremely bad combination because it creates a blurry effect. This is pointed out often by Schaffer and coauthors: "Avoid pure blues and reds" (Schaffer 11-1), and "Using red and blue together is the worst combination" (Schaffer 11-9). Not only do red and blue together make text seem fuzzy, many color-blind individuals cannot tell the difference between the two colors – so, for them, there is no text on the page. An effective design incorporates these ideas into a site by using colors only when necessary, using good-sized fonts that are easy to read for old and young eyes, and by using them to create nice contrasts between page elements, especially between the text and the background. The following table shows the scoring guidelines for text contrast and background color and scheme. However, there are no true guidelines for the latter two because, as long as a site exists, it has a

background color and a color scheme for that background. Therefore, all sites get a score of 10 in these areas since they are inherent in the medium.

Table 21. Background Color, Color Scheme, Text Contrast with Background heuristics

Category	Score	Guidelines for Scoring
Background Color	10 (Color)	10 All
Color Scheme	10 (Scheme Type)	10 All
Text Contrast w/Background	1-10	1 Same color 2 Almost same color 3 Text lost in background 4 Red and blue 5 Average contrast, small font 6 Average contrast, earth tone or other 7 Avg. contrast, good size font, earth tone 8 Great contrast, other color 9 Great/good contrast, small font, earth tone 10 Great contrast, good size font, earth tone

Since color automatically attracts the viewer's attention, its use must be strictly controlled. This is equally true with movement. Many web site designs incorporate interactive elements that include movement and animation in order to draw the reader in and to take advantage of the hypertext medium. Movement and color need to be even more closely controlled when used together. It should be done sparingly, and in a way that does not detract from the user's current task. Used together, they can effectively draw the viewer's attention and highlight important information. Since movement, interaction, and dynamic information are somewhat unique to web-delivered information, principles guiding its use are not always well understood or emphasized. However, all these designers acknowledge that it is important to help the user with their task rather than distract them from it with useless animations or movement. Where it is easy to add color, graphics, and movement to a site, design guides suggest, much like Tufte: "less is more", as in the following table.

Table 22. Color and Movement heuristic

Category	Score	Guidelines for Scoring
Color and Movement	1-10	1 No movement and color 2 Too much/too little movement, no color 3 Too much/too little movement and/or color 4 Too little/lots of movement, little color 5 Too little/lots of movement, lots of color 6 Some movement, no color 7 Some movement, lots of color 8 Some movement, little color 9 Lots of movement, some color 10 Some movement, some color

Integration of Text and Graphics

In order to create a truly effective design, Tufte declares that text and graphics should be integrated to efficiently present the information. This also heralds back to the ideas discussed in the micro/macro and small multiples principles. It is important to use the two together in order to better communicate meaning, to associate the two in close proximity to each other, and to help the designer avoid the overuse and extraneous use of graphics. The ability to integrate words and images is one of the main concerns of Tufte and web designers. The proper integration enables the designer to tell a story (Envisioning 116). Tufte gives several suggestions on how to avoid cluttering the page with unnecessary "chartjunk" (chartjunk is extraneous graphic representations that do not add any value to data displays), an earmark of designs that use graphics merely for the sake of graphics. Words and images, he says, both have the purpose of conveying information. He says that cosmetic decoration should never be used to make up for lack of content (Envisioning 35). Graphics should only be used when they help to convey information, and to support or add to the existing content. Graphics and text should be used together because they both have the purpose of conveying information. Also, by using them together, the viewer does not need to be tasked with linking the separate elements in order to create meaning and data (Envisioning 116). There is a delicate balance between employing text with graphics that help the reader, and overpowering the viewer with too many graphics. But, that perfect balance can be seen when a design uses graphics solely to advance the presentation and understanding of data, when every graphic "belongs" to the design, and when every graphic is tied to and integrated with the text.

For web design guides, the integration of text and graphics is equally important. They can be combined in many ways on a web site: text can appear in the graphic, as a text label that appears close to the graphic (usually directly above or below the graphic), or the content text can reference and link to the graphic. When graphics have text, it helps ensure that they are necessary to the design. Many web designers point out that text and graphics belong together: "Effective web graphics combine textual and graphical elements in order to convey information" (Lemay, et al. 181). Lemay devotes almost an entire chapter to the integration of text and graphics on a page, and how to get the best rhetorical effect from placement and use. These ideas contribute to this table.

Table 23. Text and Graphics Combined heuristic

Category	Score	Guidelines for Scoring
Text and Graphics Combined	1-10	1 No graphics 2 Never combined 3 Sometimes in nav or banner 4 Sometimes combined 5 Usually in banner 6 Always in banner 7 Usually in navigation 8 Always in navigation 9 Usually combined 10 Always combined

Equally important is the ratio of text to graphics. The flow of text around graphics, use of tables to position graphics and text together, and combining them in page banners, all aid in integrating the two so that they work together for the author's purposes. Although the ratio of text to graphics will be higher on the main page of a site, it will probably still be in the range of 40% text to 60% graphics, while subsequent pages should see a ration around 70% text to 30% graphics. Figures that resemble these numbers are suggested by Jakob Nielsen: "As a rule of thumb, content should account for at least half of a page's design, and preferably closer to 80 percent. Navigation should be kept below 20 percent of the space for destination pages, although navigation options may account for much higher proportions of home pages" (Designing 22). These numbers are the basis of lots of research that show that too many graphics end up being decorative, slow page loading times, and increasing user frustration and impatience. Any less than this, and the design becomes too text heavy and cumbersome. The following table shows the scoring breakdown for ratios of graphics and text.

Table 24. Average Ratio Graphics to Text, Average Ratio Graphics to Text on Main, and Use of Text and Graphics heuristics

Category	Score	Guidelines for Scoring
-Avg. Ratio Graphics: Text - Ratio Graphics: Text on Main Page	2,4,6,8,10 (0%-100%)	2 100% or 0% 4 81% - 99% 6 1% - 9% or 61% - 80% 8 10% - 29% 10 30% - 60%
Use of Text and Graphics	1-10	1 No graphics 2 Only graphics 3 Too many graphics, no help user 4 Not enough/too much graphics, little help user 5 Not enough/too much graphics, some help user 6 Good/average balance, little help user 7 Not enough/too much graphics, help user 8 Good balance, some help user 9 Good balance, help user 10 Perfect balance, help user

Nielsen's comments also point out that navigation should be a significant portion of the page, yet not an overwhelming aspect (except perhaps on the home page or intermediate linking pages. The impact and design considerations for navigation were also covered in micro/macro design structures, but an understanding of integration adds the knowledge that navigation structures should tie graphic icons with textual representations of what the user should expect from the end of a link. Carol Clark writes, "Designers should use text, as well as graphical navigation buttons, to assist viewers in navigating a web page (Clark 132). Many sites use both a graphical navigation structure and a text structure that mirrors that navigation to help those who may not understand the graphics or their meanings. Landow cautions designers to "never place link markers independent of accompanying text or image" (Delany and Landow 96). The graphical navigation icons need to be well designed so that any user can almost instantaneously understand the graphic and the link. This kind of design ties the graphic with the text that viewers bring to a web site, as in the following table.

Table 25. Graphical Navigation Buttons heuristic

Category	Score	Guidelines for Scoring
Graphical Nav Buttons	1-10	1 No navigation buttons 2 Navigation text 3 Average, hard to figure out 4 Average, average figure out 5 Average w/text, easy figure out 6 Nice w/text, avg. figure out 7 Nice w/text, easy figure out 8 Average, easy figure out 9 Nice, avg. figure out 10 Nice, easy figure out

Another aspect of integration touches on how the two should interact with each other. Graphics and text must work together within a design, and should flow around each other naturally and easily, so as not to disturb the readability of the design. This concept also relates to the effective use of layering and separation to create groupings and connections between each graphic and the text associated with it. Schaffer and coauthors discuss how to combine text and graphics visually by placing a "line between the label and the icon. It does make an attachment" (Schaffer 10-29). In order to make good attachments between the text and the graphics, designers must carefully consider how to space the two and how to make connections between them, according to the following table.

Table 26. Text Flow Around Graphics heuristic

Category	Score	Guidelines for Scoring
Text Flow Around Graphics	1-10	1 No graphics 2 Not together 3 Never flowed around 4 Little flow 5 Some flow, too close together 6 Some flow, bit wide 7 Some flow 8 Flowed, too close together 9 Flowed, bit wide 10 Flowed as needed

In addition to spacing, designers must think about the placement and positioning of the graphics. "Writing and designing web pages takes some planning and thought before you start flinging text and graphics around" (Lemay 23). Planning is as important here as in layering and separating information. To make graphics and text flow together on a web page, designers can use tables to position elements, cascading style sheets positioning, the use of an alignment tag, or width and height attributes for each image. Zimmerman paraphrases Horton and coauthors about graphic positioning guidelines: "Provide textual descriptions of graphics by flowing text around graphics, using tables to position text and graphics together, and by combining text and graphics in page banners to orient the viewer to the purpose and content of the page" (Zimmerman 312). Another important consideration is the consistent use of the "ALT" attribute to specify alternative text to display in place of a graphic (for when the graphic has not been loaded yet, or if the user turns off image loading, or for accessibility for blind or other handicapped people. Also, the use of sizing tags (width and height) for graphics also makes the page load quicker and helps ensure that layout is consistent. If these tags are not specified, the content shifts around and causes lots of distraction as the page readjusts itself to fit the images on its own. The following table shows how to score these ideas for a web site.

Table 27. Deliberate Placement of Graphics with Text heuristic

Category	Score	Guidelines for Scoring
Deliberate Placement of Graphics with Text	1-10	1 No graphics 2 Not deliberate, alone 3 Not deliberate, separate from text 4 Sometimes, no size, no ALT 5 Sometimes, sized, some or no ALT 6 Sometimes, some sized, ALT or no 7 Sometimes or always, sized, ALT or no 8 Always, sized, some ALT 9 Always, some sized, ALT 10 Always, sized, ALT

Although not immediately apparent as a function of text and graphic integration, effective hypertext linking is an important aspect of the design. A graphic does not have to be a picture or drawing. The interface of the Internet is graphical because users interact with objects, whether they are actual pictures or just text. A hypertext link is even more graphical than ordinary text because it is usually a different color, bolded, and underlined. Also, viewers implicitly understand that this convention means that they will get more information or related information that corresponds to the link text. Of course, images can also be made to act like a link. So, a better term for linking in a web site may better be referred to as "interactive linking". Regardless of how links are formed, they must be well integrated into the site design. Zimmerman summarizes the suggestions of some designers: "Tilton and coauthors suggest providing context for linked pages by means of explanatory text or visually associating the link with the subject of the document as a whole" (Zimmerman 312). It is important when creating links to provide as much information about the target document as possible so that the user can make an informed decision. At the least, inline links should be sufficiently explained. Jakob Nielsen also talks about this issue: "Underlining the words that matter is important, but even better would be to include text that provides a short summary of what kind of additional information is available" (Designing 55). When users know where a link will talk them, they are able to make better and more informed decisions about what course to take through a site. "The departure page must include sufficient information to enable users to decide what link to follow next" (Designing 55). Instead of just blindly following links and potentially wasting time, users can easily figure out their best path. When graphics are used as links, it is also helpful to provide some ancillary text. This is especially true with images that have many different link areas (these graphics are known as "image maps"): a textual indication of the multiple links helps users who are unfamiliar with this implementation. Another common design for links is to place them in lists. In these instances, it is even more important to provide some explanatory text since just having a list of links is not very useful or helpful for users. "Make sure when you arrange your links into menus that you aren't too short in your descriptions" (Lemay 306). Explanatory text for links helps integration by giving the reader important information.

Table 28. Links Explained heuristic

Category	Score	Guidelines for Scoring
Links Explained	1-10	1 No links 2 Never explained 3 Sometimes (text) 4 Sometimes (text and graphics) 5 Sometimes (text, graphics, lists) 6 Usually (text) 7 Usually (text and graphics) 8 Usually (text, graphics, lists) 9 Always text 10 Always

The final aspect of integration of text and graphics revolves around the interactive elements that a site offers. Kaye Vivian writes that, "the single most important difference with writing for print publication [and writing for web sites] is the inherent ability of web communications to be interactive. Hyperlinking makes it easy for any reader to browse the information in the sequence and way most comfortable for their own style and preferences. Use a lot of hyperlinks" (Web Writing). The web site is a rich medium for providing interactive elements that can help the user and improve the user's tasks. The level of interactivity of a web site is based on how designers use image maps, moving objects, forms, links, and active elements like searching a site and guest books. Interactivity occurs any time the user responds to the design or the design responds to the user, and can be accomplished with the click of a mouse button, entering information into a form from the keyboard, or by providing moving or other dynamic elements in the display window. From the use of links to show content or to send an email at a basic level, to a programming or scripting language (like Java, JavaScript, and ActiveX) for dynamic web pages at an advanced level, interactive elements help to engage the viewer and provide functions that are not possible in a printed medium.

Table 29. Interactive Elements heuristic

Category	Score	Guidelines for Scoring
Interactive Elements	1-10	1 None 2 Little, poor (like just e-mail) 3 Little, average 4 Few, poor 5 Little, good 6 Many, poor 7 Few, average 8 Few, good 9 Many, average 10 Many, good

CHAPTER 4. ANALYSIS

There are many web sites on the Internet that seem to make some use of the design concepts behind Tufte's five principles of information design. Some sites use more of the concepts than others, and the sites are better and more usable. However, every site that is put out on the Internet has been done with the understanding that it is a world-wide web, and thus they are making an attempt to communicate across culture and differences.

This chapter contains the following sections:

- An overview of the analyses and how they were performed.
- A summary of the results for each culture and possible meanings.
- Some discussion relative to comparisons between the cultures' sites.

Overview

After developing the first set of heuristics for these evaluations, I tested them against a few of the Ford sites I had earlier looked at. This helped me to resolve any potential scoring problems or inconsistencies ahead of starting the actual analysis. I found that I had to develop a kind of "scorer's cheat sheet" that gave fuller explanations for several of the principles. I took these explanations from this thesis and condensed them to one page so that they were readily available to me and the other raters. The main trouble spots involved having a good understanding of what chunking meant, reminding us that the horizontal rule principle was more about having visual line separators than the actual HTML code "HR" that put in a horizontal rule, and the differences between a consistent site and a consistent theme (a consistent theme revolves around having similar graphic design and a consistent site has to do with how the site's design is tied to the site's purpose). However, after evaluating the first two to three sites, we got into a rhythm and did not have to refer to the explanations quite as often.

I evaluated all the web sites from a given culture before moving on to the next culture so that I would not be influenced by the other designs. While it was not possible to evaluate all 24 sites from a culture in one sitting since each analysis took about an hour and a half (up to three hours as I was learning what to look for, what the heuristic scores meant, and how to look for multiple categories at once), I would

go back over the last few sites and their evaluations to remind myself before continuing with the next set of evaluations.

I learned that it was best to go through the web site thoroughly at the beginning of the evaluation sequence so that I could become better acquainted with the site and its structure, as well as to get a good feeling for the extend of the design and the amount of information available. While this is obviously not something that a normal reader would do with a site, it is important for those who evaluate a site to fully understand it before making judgments about how it rates with Tufte's principles. Of course, the designer of the site would already have this intimate knowledge of the site and would be able to start in on the evaluation right away.

After I scored all 72 sites, I then had to go back through each site and provide explanations about why it received the scores I gave it. In retrospect, it may have been better to record (probably by using verbalization into a tape recorder) my initial reactions and scores at the time and then go back and transfer those to print. This would have allowed me to share my initial reactions and experiences in approaching the design, rather than having to go back later and try to remember exactly why the site was scored as it was. However, since I had also looked at every site by the time I put my evaluation expectations to paper, I was able to share information relative to other sites and to make those comparisons that I would not have recognized without seeing the entire body of researched sites.

Results

Based on the scoring system used in this thesis, out of the 72 sites that were evaluated, the one that most closely matched the ideals of the heuristics was SsangYong of Korea with a score of 338 out of a possible 390 points. The top score for an American site was the Ford Motor Company with 337, and the top score for a Mexican site was for Piso with 314 points. Refer to Appendix D for in depth analysis of all the sites.

Common across all the sites was the fact that only a small percentage actually had multi-cultural versions of the site, and many of those only had two versions (the first language and an English version). Since English is the dominant language of commerce and business, this is understandable. It is also easier for designers to just design an English version for all cultures outside their own. While this may be the case, it still does not help to bridge the gap between cultures where the first language is not English.

While the heuristics were definitely useful and mostly effective, they were not perfect. In hindsight, I would have made a few changes to several different categories to aid simplification or to avoid potential pitfalls. Obviously, it is easiest to score things like number of pages and percentages of graphics without much trouble or confusion because they are quantifiable. I doubt it is possible to make everything quantifiable, but some of the scores for things like consistent theme and consistent site should be worked through even more so that it is easier to make a determination about where a site fits on the scale. Afterwards, as I watched or talked to the other raters, I realized that there were far too many occasions where the rater had to make a value judgment between two scores because they were not as clear or well-articulated as they needed to be.

Also problematic is the human nature of evaluation. We put a lot of emphasis on first impressions, and those impressions impact later evaluations. Although all web sites and web designers need to design a site so that the reader has a good first impression, I found it difficult to objectively rate a site when it had a particularly bad design score in one category. My tendencies were either to judge the site harshly for all other categories, or to overcompensate and judge it too lightly. By realizing this up front, and working to overcome it by going through the entire site a couple times before making any score judgments, I had a greater capacity for doing unbiased evaluations.

Equally troubling was the difficulty I had in determining the site's purpose, especially when the designers did not state it or put the statement in a place I did not think to look. I would not want to take out this category because it is important that designers, and especially the audience, understand the purpose of the site. But, there needs to be more diligence and research around how readers determine the purpose of a site or how important it is to explicitly state that purpose when the design and the existence of the site should make it obvious. After all, wouldn't the purpose of most business sites be to let customers and potential customers know what they do and what they have to offer? Research needs to be done that evaluates if readers already understand this purpose when they go to a business site, and whether this category is more fitting for other types of web pages.

While large and complex sites need both a site map and a search feature (or at least an index), most other sites can get away with just having one or the other since the navigation scheme of a small site would most probably be the entire site map. I played with the idea of combining the two categories into one

single category for a time. However, I found that most designers recommend both, and I didn't want to contradict that. Also, while I could see a search function as being optional, I definitely could not justify making a site map optional since it is so important for helping to make the site more concrete and understandable for users. If anything, I might get rid of the search or index category and simply count it as part of the interactive elements of the site.

I found that while I could fairly easily go into the source files of each web page and determine the scores needed for graphic size and placement, as well as titles for framed pages, it was annoying to do so. It is also questionable since the users will not see these things. The only times ALT text are important are for web page reading software (which seems strange since the ALT text does not truly help a listener get the full picture of the site – a better approach would be to have an "abstract" tag where the designer could explain the site and how it is best visualized so that the listener can get the full "picture" in their mind) and for when the user either has image loading off or when an image does not load and the user wants to know what was there. This is also not the easiest category to score for those who have no knowledge or understanding of HTML or how to view the source information for a web page. Also, regarding page titles, titles of framed documents may be a moot point since technology has not yet developed (after 10 years) a way to bookmark a single framed page in an easy manner. In fact, some designs go as far as to remember the pages loaded in each frame of the framed site and then load those when the bookmark is selected. While this is great, it does not solve the problem of people wanting to bookmark multiple places within a single framed site when they have the same name (worse yet, the previous one often gets overwritten).

The color principle also needs more work. Although sites must have a color scheme and a background color, there is really no way to heuristically evaluate sites since one scheme or color is not necessarily better than any other. So, instead of simply scoring a 10 here for every site, it may be more useful to develop a couple more categories relating to color that could replace these, or at least one of them. Finally, the information that Tufte provides relative to the four uses of color were not adequate for me to make quantifiably reliable evaluations for every site. Of course, Tufte's purpose was not to quantify this principle, but to put it out as an ideal for designers to consider. However, out of all the questions and problems I have with Tufte's principles, this is the one that I would most want to directly converse with

him about in order to help me get a better understanding and appreciation for the complex issues around color use.

America

Overall, the American sites provided a nice control group since the sites did not score in groups with similar scores as happened with the Mexican sites. There is a lot of variance in scores for the American site. In general, the American sites did well at keeping the main page to a single screen in length for easy access to all the information at once. The American designers also typically did well with keeping the navigation in areas where users can easily get at them. Next, the sites did well with repeating the logo across the sites. This small multiple score is interesting because it may point out that Americans are overly concerned with branding or with identifying what is "theirs". Next, the average number of colors for American sites was overall very good. Finally, the designers maintained a nice ratio of graphics across the entire site. Overall, the American sites scored at least average in all other categories, except the ratio of graphics to text on the main page, where there were quite a few low scores.

Mexico

The Mexican sites, while not scoring nearly as well as I anticipated, worked well to emphasize the scores that can occur when a site is created by a culture that generally has not had as much access to technology as other cultures. However, it is interesting to note the general high and low points of the Mexican sites in general. The designers generally did well at keeping the site's theme consistent throughout the site. Also, the designers typically used a simple, plain background that did not interfere with the data. Next, the site designs had a good average number of colors and a nice average ratio of graphics and text throughout the site. These categories all relate closely with the artistic values of the site, so it seems clear that Mexican designers have an innate ability with artistic representations. As indicated in the microscopic analysis, the sites have trouble with movement and interactivity. But, these are really the only general trouble spots throughout the Mexican sites.

Korea

The scores for the Korean sites are generally higher than those for the American sites in the top half of the sites, but generally lower in the bottom half. The Korean sites have many areas that are generally

good overall. First, the designers did not have much problem with designing sites with a short main page. Next, the designers typically did quite well at creating a nice flow of the text around the graphics. The designs around these graphics maintain a nice ratio of graphics so that they do not overpower the site. Finally, the sites generally all included a statement of purpose that tied in with the design and site theme. On the trouble area side, Korean designers seemed to have trouble with keeping the ratio of graphics to text on the main page to a minimum. The designs did not use a lot of headings or rules to help in chunking. Typically, the designs used white space or just chunking into different pages so that these tools were not as important, but the designers could still use these things to improve the sites for usability. Finally, the sites generally did not have the best page titles. Mostly, they were just the company name for everything.

Comparisons

In comparing the sites, it is immediately obvious that the American and Korean sites are generally more polished than the Mexican sites, meaning that the sites are more "designed" to be usable in the hypertext medium (probably because of exposure time, design resources, and so forth. However, there is not really that large of a gap between the three groups, as you can see in Figure 8 and Figure 10 (in the Appendix). The data that comprises Figure 8 reveals that the sites are all within the same scoring band across the board. For this figure, the number of hills and valleys is not important nor even the magnitude of the dips and bumps, but the close relationship that all the sites have to all the other sites in the three cultures. Figure 10 shows the sites arranged by highest to lowest scoring for each culture. While it is interesting to note how closely the graphs mirror the others and that America and Korea are closer together than Mexico, the real important data for this figure shows the groupings of scores where a culture's sites score in the same range. As mentioned previously, it is obvious from these graphs that the American sites do not fall into easily defined groupings, but are spread all over the spectrum (except for a couple obvious groups at the low end of the chart). But it is also immediately apparent that most of the Mexican sites fall in the middle of the range for that culture, while the Korean sites fall into several small groups throughout the score levels. It would be interesting to review sites from three or four more cultures so that I could see better where the Mexican sites score compared with more than just two other cultures.

Of the 72 sites reviewed here, it is also interesting to note the general lack of interactivity across the sites. Although most use links and at least an email contact link, that is about all the interactivity that

the designers incorporate. This shows a general lack of understanding of the capabilities of the web, or perhaps a lack of funding for creating the more interactive sites, despite the great good that this interactivity affords users. Although these sites were gathered a few years ago and technologies have changed a lot, it may be appropriate for other research to explore the changes, specifically those relating to interactivity, to mark the improvement, if any.

No matter what the culture or design, the results of this analysis make it clear that sites that take steps to ensure multi-cultural access seem to automatically score well in these categories. Thus, it seems evident that the categories indeed relate well with Tufte's five principles of designs.

CHAPTER 5. CONCLUSION

The ideas behind Tufte's principles can be found in the pages of web and interface design gurus and in books about proper web design. The principles that Tufte espouses provide a means whereby the reader of a web page can evaluate the effectiveness of web pages in conveying information to culturally heterogeneous audiences. Businesses, also, will be able to use these principles as they prepare and update their own business web sites, so that their design will not hinder their message. The principles of micro/macro design, layering and separation, small multiples, color, and integration of text and graphics are an effective means of evaluating multi-national web pages, as Tufte's principles can be applied universally for all cultures.

This chapter includes the following sections:

- Overview of this chapter.
- Recommendations for further study
- Summary of the results of this analysis and the application to the purpose

Overview

The set of heuristics developed from this thesis are the beginning of the discourse (the start of the discussion) needed to better evaluate cross-cultural communication on the Internet. While applying Tufte's principles of information design to web sites has been useful, it is not perfect, and there is much left to do and to say as part of this discourse. Therefore, before I even begin to summarize what I've learned, it is important to acknowledge areas that researchers and designers would do well to investigate further. It is my hope that this text and these heuristics will also be able to morph and grow as the discourse progresses, so that we can create a great new culture that values communication and strives to send messages in the most effective means possible.

Recommendations

I have done a lot of research and accumulated a lot of data because of this thesis (some of it is included in the extensive Appendix). However, I still could not cover all the ground that I would have liked to. It was disappointing that I could not get any designers to respond to the survey so that I could study the principles relating to audience response and designer response better. Future study should look at the way

people search through or navigate a site (even these sites), and how the designer responds (or does not respond) by updating and tweaking the site's design. This is true interactivity, and could not be studied in the context of this thesis' methodology. I recommend that future research be done by actual consultant web designers, who track the changes that they make to the various types of sites, and then correlate those changes to site tracking logs and visitor requests. This needs to be tied with observations from qualified human factors consultants who can adequately account for the consciousness that this tracking gives the web designer. Ideally, the study would use designers who already do this type of thing so that the tracking does not interfere with or skew the data. The web is in constant flux, and so web pages have an iterative nature that Tufte cannot account for. A study of this magnitude would help emphasize the correlation between content and presentation and how they work together to make a site truly good.

The heuristics created for this thesis to evaluate sites are useful for judging existing implementations for areas of improvement. However, it can also be useful to use these ideas to design better sites in first place by integrating as many of the best practices mentioned in the scoring tables as possible. It may also be useful to apply these principles to other designs and other types of web sites. In the first case, the heuristics may have to be adapted to be more appropriate so that there were some unique heuristic points of evaluation criteria for this different media. In the latter case, the heuristics used here should be appropriate for evaluating all sorts of web sites. However, since this thesis does not study other kinds of web sites, it would be useful to perform an initial study of several kinds of sites to determine how well the heuristics apply across various genres of sites.

Next, I recommend a follow-on study to this one where part of the methodology includes actually getting a survey out to determine levels of design and purposes from the designers' perspectives. Another research project would do well to include an even broader sampling of cultures and their web sites to verify that the conclusions reached here still hold true. This study may even find more patterns of design and additional categories to use for evaluations based on those patterns. Additionally, it may be effective to study the translated versions of sites instead of just comparing original language versions. This would be especially appropriate in evaluations that include context and discourse efficacy in the scoring tables.

To web site designers, I recommend the study of these sites so as to better emulate the best qualities and to avoid the common pitfalls. By considering the design of a site before the implementation, designers can more easily see constructs and patterns that will aid users of all cultures in the use of the site.

In order to make a truly useful thesis, and one that definitely continues the discourse, further studies should not confine themselves to paper and the printed medium. This adherence to academic tradition hinders the collaboration that should be taking place. This is especially true in the field of English, where typical theses and research projects focus on printed media and works as the topic of discussion (in which case a printed project can be useful). The ramifications of this present thesis work, and the convergence of text and design, call for a restructuring of the traditional categorizations of academic disciplines. There has been some resistance among English faculty to this "new" way of defining text and how to analyze that text. It is not that the categorizations are not still useful; after all, Lakoff emphasizes in Women, Fire, and Dangerous Things that we have an innate need to group things in like containers, and we do so based on our experiences (as is the case with the book title). The problem comes when we put those groupings in "concrete" so that they are unchangeable, regardless of societal changes that occur to make those initial groupings counterintuitive. So, one ramification of this thesis is a call to education administrators to reevaluate the lines of what is classified as "literature". These educators need to consider the idea that a well-designed and useful web site should be considered equal to a piece of literature with excellent exposition, dialogue, story line, and characterization.

Furthermore, since the web medium is in constant flux, research of this medium also needs to be in flux, and open to the discourse community to add to and change this discourse. Authorship becomes less important (although still valuable to gauge authenticity and authority), and content and the exchange of ideas and information become paramount. By printing out this work and binding it and then placing it on a library shelf, the discourse becomes separated from the medium. At least with theses that consist of an analysis of a traditional literary work, the literature being evaluated is on a library shelf nearby. This work, and others like it, needs to be put online so that it can grow and shift with the web. I have tried to get closer to this by supplying a CD-ROM with the thesis, which I hope users consult more than the mere words in this printed version of the thesis. But, I have also created a web site for this thesis and a discussion of the thesis at http://www.garrettwinn.com/thesis.

I also recommend that researchers study the instances where web design principles are turning back on traditional print media and affecting Tufte's principles. For example, it is now fairly common to see blue, underlined words in print. The web generation (and most other people) understands this to mean a hypertext link instinctually, even though they cannot actually "click on" the printed words to follow the link. I have also noted that the mouse cursor icon has crept into print. And, while computers have been around longer than the Internet, I believe it is the ubiquity of the Internet that allows for this cultural phenomenon. Finally, even Internet jargon is invading the print media: things like download, 404 error, and linking have found their way into speech and writing. Not to mention the change in design strategies that focus on chunking information more and targeting an increasingly impatient group of users who want information now. The Internet has affected a study of what, and its design standards would be useful and intriguing.

Summary

While I initially envisioned the development of an exciting new way to analyze web sites that would raise my name above other pioneers, I was quickly brought to the realization that this is just a thesis that is meant to show the cumulative effects of what I learned in my time as a graduate student. Although this is a bit disappointing because I would rather be world-famous and be able to solve all the world's Internet communication problems in one fell swoop; my studies have had a profound effect on me, and that is a great place to start.

As stated previously, the main goal of this thesis is to share with other researchers what I learned while attempting to create this set of heuristics and then use those heuristics to analyze web site designs from a few different cultures. I wanted to enlighten contrastive rhetoric analysis and to begin to provide the necessary tools in performing that analysis and understanding those communications, as well as bring it and information design closer together in the designer's view. The reader is directed to Chapter 4 for information about what I learned from performing the microanalyses. Additionally, Chapter 2 contains all the information I learned in relation to the research I had to do in support of designing heuristics and how to perform the analysis in the first place. But, it is only after doing the research, creating the heuristics, applying them to 72 web sites, and then accumulating the data from it all that I can fully account for what I learned and what the true conclusions to this thesis are.

The most important lesson I learned is that evaluation is quite difficult and time-consuming; especially when it is as complex as the heuristics I developed. This is not to say that the evaluation is useless or the heuristics too involved. To the contrary, I believe even more strongly now that designers need an authoritative, respected set of guidelines to help them create sites that do not create unnecessary cultural barriers to entry or understanding. Equally important is the respect I gained for the difficulty of designing information so it is useful, usable, and valuable. I had not earlier appreciated the need to fix all the "chartjunk" that designers have put on the Internet. Perhaps if we got rid of it, the Internet would not be quite as big and intimidating as it now seems for too many people. Seriously though, I have learned how important it is to balance presentation with content while designing the presentation to be as transparent as possible in order to emphasize the message and encourage communication.

Tied with this creation of the heuristics are the problems with "expanding" Tufte's five principles to account for web site design. Since Tufte's work is focused in the print medium, I had to first figure out Tufte's reasoning for each principle and what the principle was really getting at. While he does give some of this information in his books, mostly the reader is left to infer them through the examples and his explanations of what works and what doesn't. So, I had to become very familiar with each principle individually, even as comfortable with them, in some aspects, as Tufte himself is. If I misinterpreted any part of a principle, that could affect the outcome of this thesis. However, because I drew support for each of the categories in the heuristics from well-respected and renowned web design experts, I do feel fairly confident that these categories come close to what Tufte himself would acknowledge had he written a book about the online medium and his principles.

Because of my use of other experts, I can look at the outcomes and the process in a critical light. The heuristics do coincide with what other web design experts are saying, so that even if Tufte would not include them in his principles in the same way or using the same criteria that I did, the categories have the backing of many other design experts. But that is not the part that really could cause trouble for those attempting to use this thesis as a reference. What is really in question is the scoring system for each category, and what the raters and I had to go back to again and again during the evaluations. Part of the problem is that the explanations in the tables are succinct and brief. While this helps in presentation (keeping everything to a single line of explanation generally), it is not a help to those trying to do the

rating. These brief hints are meant more as a reminder after one reads the information about how each category was developed and what Tufte and other design experts say in relation to it. When one fully understands those parts, then it is much easier to be consistent in using and in understanding the scoring system. Part of the ongoing discussion for this thesis at http://www.garrettwinn/thesis is the development of new "definitions" for each category so that the heuristics are easier to understand without having to do a lot of background reading. Doing this will help make the scoring by a variety of raters even more consistent, especially when I am not there to answer questions or provide guidance on what a score point means in relation to other points.

Additionally, while I tried to be as fair in the selection of web sites as I could, there are a lot of American automobile makers with web sites on the Internet, so it was not easy to find littler companies out there that haven't been swallowed up already. Since I do not have a lot of experience with either Korean or Mexican auto markets, I really cannot say if I got all the major companies from those countries on my list. Of course, Hyundai, Daewoo, and Kia were all easy to deduce from Korea because of their American popularity. But, there may be other large and popular companies there that are not as well known in America, or perhaps that build cars for countries excepting America. With Mexico, Internet search results did not reveal any auto manufacturer web sites. This could be because there are no auto makers in Mexico (or South America in general), or that the ones that are there do not have a strong Internet presence and so do not show up easily in search results. Tied with this is the problem of just how effective the search techniques were in searching for and finding the best results lists. Part of the search included the use of culture-specific portal pages to help locate and rank the sites, but the transience of the web can cause problems for anyone trying to take a snapshot of a small section of the Internet pie. However, one definite conclusion to this study is that it was not really the sites that were being judged, but the efficacy of the heuristics. In taking this stance, it is easier to be a better rater, and closer to the actual goals of this thesis: to improve cultural communication on the Internet through a site's design. This cannot be accomplished by mere criticisms of sites, but by expanding the discussion of design and how it fits in the framework of cross-cultural communication.

This thesis draws from several different fields of study. So many, in fact, that the review of literature may feel like a master of none and servant of many. Given the time and resource constraints

inherent in most any research project, it is simply not possible to become proficient in every aspect of analysis or theory that would be possible to address based on the data and ramifications of a study. For this thesis, it is easy to learn quite a lot about web design and hypertext theory as well as language studies (contrastive rhetoric, specifically) and information design. However, the review does not focus much time or space on rhetorical theory or orality, although important academics in these fields played key roles in helping to develop the theoretical base and the methodologies for this thesis. While these facts could certainly have a negative impact on the conclusions and theoretical base of the thesis, they will mostly just provide a negative impact for those who would use this study to support theory from those disciplines. These pieces of theory from these areas help us understand better what is happening in this thesis, and help the reader understand better the extent of the training required for this English Master's program – since all the instruction received in the program influenced, to one degree or another, this entire thesis (even if I did not fully understand or grasp the significance of the theory or ideas). Of course, the information is also provided here to help the reader to understand the conceptual basis for the heuristics and especially for the categories that grew out of the interpretations of Tufte's principles of information design.

In the end, I also hoped to better understand multi-cultural design issues and to determine how Tufte's principles can be applied to web sites while adding data about this important medium to Tufte's work. I can honestly say that I do have a better understanding of multi-cultural design issues, even if I do not have a great understanding yet of other cultures. Obviously, that is a life's work, and one that I intend to continue, as I also feel the importance of gaining greater understanding of others who are different than me. While I have no illusions about Tufte calling me on the phone and requesting of me to help him author his next book, I do believe that the ideas presented in this thesis are valuable for information designers of all types to internalize and use, even if the application of those ideas into a specific set of heuristics is not useful for them.

The creation of an "expanded" Tufte is, of course, not without problems. As discussed previously, Tufte's principles do not totally account for the conflicts a designer must face between usability and the marketing manager's demand for more ad space or chunking of information in strange ways. While it is important for the designer to be an advocate for the users in these cases, sometimes the fight is just too big and requires more effort than the designer can give. Part of my hope in creating these heuristics is to give

designers a tool they can use against “hype” and the rampant commercialism to prove that there need to be other options and other ways because when designs frustrate the users, no amount of ad space will help the corporate bottom line.

I question Tufte’s evaluations of white space, as it is applied to web design. Screen real estate is precious, especially everything “above the fold” within the first screenful of information, for a web page, but it is also possible to scroll down to other information, whereas in a print media, the designer is pretty much restricted to a certain paper size, or at least a maximum paper size. It is also very important in web design to provide white space to help guide the viewer’s eye and to break up the long lines of text, which are harder and more cumbersome to read on a computer monitor according to many studies. While Tufte certainly does not advocate getting rid of white space, he does preach the importance of density of information. This can cause problems if we just transfer it straight across and say that designers should not use white spacing or other spacing techniques for web pages. Instead, we need to understand it as providing small spots of data that are easily digested and assimilated, in much the same fashion as color is to be used in spots on the page to draw attention and to present information. And so, evaluators must not confuse the scoring system for Space Use that gives a score of 10 to a highly dense and not confusing site, with the idea that this applies when there is just a lot of data or strings and strings of text. In the future, it may be better to have evaluators blur out the content of the site and focus on the groupings and the spacing around those groupings, and then how those groupings relate to each other to present all the information. In fact, part of the density factor involves how well the designers can get readers to make inferences and assumptions based on what is there without having to spell it out to the reader. This makes for a very dense presentation, in much the same way that certain books can be read over and over and still give new insights each time because of new associations made and because of the development of several levels of meaning in the words, designs, and art.

The category of Color Use is also a bit troubling because there is nothing to say that a design is better if it uses all four types of uses than if it uses just one. Therefore, this score can be deceptive to evaluators and data miners who would just use the scores to rank a site blindly. First of all, this set of scores does not provide for a value judgment as to how well the use type is applied. While some of the other scores may help account for this, I need to provide another category that allows evaluators to score a design

based on how well it incorporates these use types, without focusing on how many the site uses. On the other hand, because a site usually involves numerous pages as part of the presentation, there is every reason to expect that a design would use color in every good way possible to aid the design the most. Perhaps another (or a better) category would focus on Color Use on the main page for the site since this is the one that most visitors will encounter most often and that will drive user impressions the most because it acts as a portal to the rest of the site. Thus, Tufte's discussion of use types may not stand up well to a system that attempts to give a score to a design instead of just a reflective assessment.

Through this experience, I came to see the World Wide Web as its own unique, newly formed culture where the presentation of information is essential regardless of the language used or understood by the user. My purpose was to create a fairly broad set of heuristics based on universal, multi-cultural principles to guide a designer toward more cross-cultural designs that focus on content rather than fluff; but I do not assume that this is the only way to generate multi-cultural designs. However, this thesis does make a contribution to the current discourse. In fact, I have talked with or had email discussions with at least ten different people since the time I began this thesis (I have talked with more, but at least 10 have indicated more than a passing interest) who have asked me to send them a copy of the thesis when I am done because they are interested in the direction it takes web design. And so, I cannot view this thesis or the time involved as a failure or ill spent.

The results of this thesis point to the conclusion that Tufte's principles can indeed be universally applied to the discourse of heterogeneous cultures for a variety of media. However, as Tufte warns, "Most principles of design should be greeted with some skepticism, for word authority can dominate our vision, and we may come to see only through the lenses of word authority rather than with our own eyes" (Visual Display 191). Thus, it is imperative that we continually question these principles, relying on our experiences and the experiences of others to inform our design decisions. The evaluation method and tables used here can be valuable if they are taken in this light, and not simply as a means of provided a checked list of imperative design elements. Designs succeed and fail for a variety of reasons, and some may have little to do with the actual user interface. Audience is everything, and designers truly need to study their audience and that audience's needs and desires. If anything, this evaluation method can help novice designers to learn and apply some basic web design principles to their early designs. Once these people

learn the basics and the reasons behind the principles, they can more easily choose the appropriate occasions for breaking or bending the rules.

This conclusion is really more of a beginning. A beginning of the discussion. A beginning of communicating in a meaningful way between cultures through the web medium. A beginning of learning. A Master's Degree is not the end of the educational experience (throwing aside the possibility of a Doctorate), because any true "Master" in a discipline understands that the more you learn the more you understand that you know less and less. Before this thesis, readers could read a book or two about web page design and assume that they know about everything there was to know about web site design. Even those who have been designing web sites for years and done their fair share of research into what web designers say and do, may find that after exploring the ramifications of this thesis and applying the principles to their old and new designs, that they were merely beginners in design before. In fact, designers would do well to no longer just go off gut instincts on what looks good when creating a design (which is not all bad except when it is the only source of inspiration), but constantly refer back to the principles and categories of this thesis to reinforce and inform their decisions. And, after gaining even more experience and knowledge, they may have occasions when they decide to go against the "10 score" of a category, not out of ignorance, but with a good knowledge of the reasons behind the suggestion and substantiation as to why they can break the rule (instead of breaking the rule because they do not understand it). Also true is the fact that a Master is someone who is a teacher, and the teacher always learns more than the student in the process of transferring knowledge. Therefore, since this thesis is the cumulative result of studies for a Master of English degree, this thesis and the discussion on the thesis' web site will continue to provide learning about design and continue to teach others (including this author) about the importance of design in cross-cultural settings.

APPENDICES

The following appendices are for those who need more support for the heuristics designed in this thesis, including all of the detailed analyses of the web sites.

In these appendices, you can get the following information:

- Bibliography information
- Sample survey for webmasters
- Scoring heuristic tables for the design principles
- Blank evaluation forms and evaluation analysis
- CD-ROM that provides downloaded versions of the web sites and an online version of the thesis

APPENDIX A. BIBLIOGRAPHY

This appendix provides sources for more information and reference information for the research conducted to support this thesis. This bibliography includes a works cited section, a works consulted section, and tables of the original web site addresses for each of the web sites reviewed in this thesis.

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Hyosung. http://www.hyosungmotors.co.kr (17 Apr. 1998).

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Web Sites Evaluated

I reviewed a total of 72 web sites from American, Korean, and Mexican companies. The following tables show the web site name that I used in the thesis and in scoring tables, the full name of the company (if different from the web site name), and the web site address where I originally located the site.

American Web Site Addresses

Web Site	Full Name	Address
AC Delco		http://www.acdelco.com/index.htm
Buick		http://www.buick.com

Cadillac		http://www.cadillac.com
Chevy	Chevrolet	http://www.chevrolet.com
Chrysler		http://www.chryslercorp.com
Dynacorn		http://www.dynacorn.com
Ford		http://www.ford.com
GM	General Motors	http://www.gm.com
Gex		http://www.gex.com
Harley	Harley Davidson	http://www.harley-davidson.com
Isuzu		http://www.isuzu.com
Jeep		http://www.jeep.com
Lexus		http://www.lexus.com
Mack	Mack Trucks	http://www.macktrucks.com
Mann	Mann & Hummel	http://www.mann-hummelauto.com
Mercury		http://www.mercuryvehicles.com
Navistar		http://www.navistar.com
Oshkosh	Oshkosh Trucks	http://www.oshkoshtruck.com
Plymouth		http://www.plymouthcars.com
Saturn		http://www.saturn.com
Superior		http://www.customwheels.com/superior/
Titan	Titan Motorcycles	http://www.bikersdreamaz.com/titan.html
Tyres		http://www.tyres1.com
Wheatley		http://www.wheatley.com

Mexican Web Site Addresses

Web Site	Full Name	Address
Ahmsa		http://www.ahmsa.com
Alfa Nemak		http://www.alfa.com.mx/inf97en/versax.htm
Aral Mex		http://www.ina.com.mx/expo/aralmex/
Arbo Mex		http://lelaya.teesa.com/arbomex/
Baleromex		http://viernes.iwm.com.mx/servicios/baleromex/
Clemex		http://www.ina.com.mx/expo/clemex/clemex.html
Dirona		http://www.ina.com.mx/expo/dirona/
Enermex		http://www.grupoimsa.com/enermex/
Ferrocarril		http://www.fcab.cl
Filtros Mann		http://www.ina.com.mx/expo/filtrosmann/
Hylsamex		http://www.hylsamex.com.mx
Intehc		http://www.intehc.com
Mondial	Mondial Motors	http://www.mondial-moto.com
Moto Roma		http://www.motoroma.com.ar
Performance	Performance Enterprises	http://viernes.iwm.com.mx/servicios/pemexico/
Piso		http://www.serv3p.com/es/polifilm/piso-auto/piso-automotriz.htm
Proeza	Proeza Automotriz	http://www.ina.com.mx/expo/metalsa/index.html
Ramirez		http://www.cintermex.org.mx/hotpages/gruporamirezi/
Rassini		http://www.ina.com.mx/expo/rassini/
Tecate	Tecate Wheels	http://tecatewheels.simplenet.com
Tepeyac		http://www.ina.com.mx/expo/tepeyac/

Tomco		http://www.tomco.com.mx
Trebol		http://www.gitrebol.com.mx
Vitro		http://www.vto.com/vto98/espanol/frame0.htm

Korean Web Site Addresses

Web Site	Full Name	Address
A-ju	A-ju Metal Industries	http://www.kita.or.kr/Kyongnam/com2_e.html
AutoKorea		http://commerce.ktnet.co.kr/Companies/autokorea/
Daejin	Daejin Industrial	http://kosp.co.kr
Daelim		http://www.daelim.co.kr:80/index.html
Daewoo		http://www.dm.co.kr
Dongjin		http://www.dongjinltd.co.kr
EMS	EMS International	http://www.usedcars.co.kr
Hanchang	Hanchang Chemical	http://www.hccc.co.kr
Hankook	Hankook Tire	http://www.hanta.co.kr
Hyundai		http://www.hmc.co.kr
Jaeil	Jaeil Engineering	http://www.enet.co.kr/jaeil/index.html
Kia		http://www.kia.co.kr
Korea Eng.	Korea Engineering	http://www.koreaeng.co.kr
Korea Gas	Korea Gas Corporation	http://www.kogas.or.kr
Kumho Chem.	Kumho Chemicals	http://mpc.co.kr
Kumho Tire		http://www.kumho.co.kr
Kunhwa		http://www.kotra.or.kr/homepage/hs87/kunhwa.html
Nam Yang	Nam Yang International	http://bora.dacom.co.kr/~englword/sponsor.htm
Samsun	Samsun Industrial	http://www.smipc.or.kr/smipcsearch-cgi/homepage.cgi?Co_Code:199&lnguage=0
Samsung Ele.	Samsung Electric	http://www.samsung.co.kr
Samsung Hea.	Samsung Heavy	http://www.shi.samsung.co.kr
SsangYong		http://symc.ssy.co.kr
Sungbo		http://soback.kornet.nm.kr/~sungbo/
Yukong		http://www.yukong.co.kr

APPENDIX B. SAMPLE SURVEY

I sent the following survey to several web site creators in order to determine their involvement and goals with the design so that I could use that data to inform my analysis. However, nobody returned my survey, so I excluded designer intention from the analysis.

My name is Garrett Winn. I am a graduate student at Brigham Young University, and I am in the process of writing a thesis on cross-cultural communication on the Internet. I am evaluating several business sites from around the world. I have noticed your company's site, and would like to ask you, or the person who developed the site a few questions that will help me to write a better thesis.

I would greatly appreciate your help in this, however, if you are unable or unwilling to do this, please let me know so that I can account for it in my data. Thanks in advance.

Questions:

1. What do you consider your native language to be?
2. On a scale or 1 to 10 (1=minimal, 10=native-like), rate your present fluency in your native language (speaking and writing).
3. What other language(s) do you know?
4. Rate your present fluency in this (these) language(s), on the same 1 to 10 scale as in question 2.
5. How much time did you spend in designing and creating this web site?
6. Did you do it alone or did you have help? If you were helped, by whom?
7. What tools or software, if any, did you use to make the site?
8. What was the basis for the design of the site?
9. What do you consider your inspiration for this design to be?
10. How do you feel this site reflects your culture?
11. What was your purpose in creating this site?
12. Who do you consider to be your audience for this web site (who do you expect to see your web pages)?

APPENDIX C. SCORING HEURISTICS

In order to be more consistent in scoring and to be able to easily replicate the scoring, I created several categories for each design principle that corresponded with Tufte's intentions for that principle. Then, I created a scoring system for each category, usually ranging from 1 to 10, with explanations of what each score means for each category. For more explanation about why each category was created and for why certain design decisions correspond to certain scores, refer to the Application of Principles to Web Sites section.

In the micro/macro principle, I include the scoring guidelines for the Overall Score of all five principles. Given the total score from each principle, you can determine what score, from one to ten, the site receives overall, thus giving a quick, general way of comparing the site with other sites.

Table 30. Micro/Macro heuristics

Avg. Scr/Main Page	1-10 (Integer)	1	6.1+ screens
		2	5.1 - 6 screens
		3	4.1 - 5 screens
		4	3.1 - 4 screens
		5	2.6 - 3 screens
		6	2.1 - 2.5 screens
		7	1.76 - 2 screens
		8	1.6 - 1.75 screens
		9	1.26 - 1.5 screens
		10	1 - 1.25 screens

Site Purpose	1-10	1 Nowhere to be found 2 Linked to (or on main), but not avail. 3 Linked to (or on main), but bad 4 Linked to (or on main), inconsistent w/customer 5 Linked to (or on main), inconsistent with site design 6 Slightly inconsistent 7 Implicit in site (with theme, graphics) or on main 8 Good purpose but hard to find 9 Good purpose but somewhat hard to find 10 Stated explicitly
Consistent Theme	1-10	1 No theme 2 Theme inconsistent with purpose 3 Never consistent theme 4 On 1-2 pages consistent 5 On 3-4 pages consistent 6 Sometimes consistent 7 Often consistent 8 Always on main page 9 Always on main layers 10 Always
Consistent Site	1-10	1 No consistency, no purpose 2 No consistency, some purpose 3 No tied, bad purpose 4 Poorly tied, bad purpose 5 Tied, inconsistent with purpose 6 Some tying with purpose 7 Some tying, all purpose 8 Ties ok, all purpose 9 Ties well, all purpose 10 Highly consistent, all purpose
Page Titles	1-10	1 None 2 Only on first page or poor 3 All same, frames 4 All same, no frames 5 Average naming 6 Good, bit confusing 7 Average naming, helpful 8 Good, helpful, no levels 9 Average naming, levels 10 Good, helpful, levels
Space Use	1-10	1 Too much blank space (important) 2 Too much blank space (unimportant) 3 Lots blank space, no org 4 Not very dense, somewhat confusing 5 Average use 6 Highly dense or too much space, very confusing 7 Somewhat dense, somewhat confusing 8 Somewhat dense, not confusing 9 Highly dense, somewhat confusing 10 Highly dense, not confusing

Navigation Access	1-10	1 No navigation 2 Always must scroll or only first page 3 Always scroll, but at top and/or bottom 4 Mostly scroll in first layers 5 Only scroll in deep layers 6 Scroll occasionally 7 Sometimes scroll, but not distracting 8 Bigger screen would not scroll 9 In frame, but scroll 10 Never scroll
Languages Available	2,4,6,8,10 (E English S Spanish K Korean C Chinese J Japanese O Other M Many)	2 Base language 4 Base + 1 language 6 Base + 2 language 8 Base + Many main language 10 Base + Many language
Languages Separate	1-10	1 No language translation 2 No choice 3 Same page, just translated 4 Same page, links to each translation 5 Same page, somewhat different 6 Same page, very different, poor translation 7 Same page, very different, avg. translation 8 Diff. page, from first only, same look 9 Diff. page, from first only, diff. look (or diff, link, same) 10 Diff. page, link always, diff. look
Overall First Impression	1-10	1 No multiculture, no Tufte design 2 No multiculture, some Tufte 3 Some multiculture, little Tufte 4 No multiculture, lot Tufte 5 Some multiculture, some Tufte 6 Lots multiculture, little Tufte 7 Some multiculture, lots Tufte 8 Lots multiculture, some Tufte 9 Lots multiculture, lots Tufte 10 Perfect multiculture, perfect Tufte
Overall Score	1-10 (0-390)	1 0 - 40 2 41 - 80 3 81 - 120 4 121 - 160 5 161 - 200 6 201 - 240 7 241 - 280 8 281 - 320 9 321 - 360 10 361 - 390

Table 31. Layering and Separation heuristics

Site Map, Search, Index	1-10	1 None 2 Sparse, no links 3 Detailed, no links 4 Too complex (or not enough), disorganized, links 5 Too complex (or not enough), organized OK, links 6 Avg. ease, avg. detail, links 7 Easy to use, sparse, links 8 Avg. ease, detailed, links 9 Easy to use, avg. detail, links 10 Easy to use, detailed, links
Simple Background	1-10	1 Cluttered, no/little contrast 2 Cluttered, avg. contrast 3 Cluttered, high contrast 4 Default gray 5 Average, no (or little) contrast 6 Simple, no (or little) contrast 7 Average, average contrast 8 Average, high contrast 9 Simple, avg. contrast 10 Simple, high contrast, focus on words
Important Info First (top left, lower right)	1-10	1 Never main, never others 2 Never main, some others 3 Some main, never others 4 Always main, never others 5 Average main, poor others 6 Average main, good others 7 Sometimes main, some others 8 Sometimes main, always others 9 Always main, some others 10 Always main, always others
Use of Headings	1-10	1 None used 2 Only 1 used for all, all same page 3 Only 1, some same page 4 Only 1 level, different pages 5 Multiple levels, no distinguish 6 Few levels, no distinguish 7 Few levels, avg. distinguish 8 Few levels, easy distinguish 9 Multiple levels, avg. distinguish 10 Multiple levels, easy to distinguish
Chunking	1-10	1 No chunking at all 2 Average, poor, (not) separate 3 Average, good, not separate 4 Average, good, separate 5 Lots (or enough), poor, not separate 6 Lots (or enough), average, not separate 7 Lots (or enough), poor, separate 8 Lots, good, not separated 9 Lots, average, separate 10 Lots, good, separate

Use of Horizontal Rules (or Frames, Tables)	1-10	1 Not used 2 Used very little 3 Distracting, haphazard 4 Not distracting, haphazard, no reason 5 Distracting, some reason 6 Distracting, good reason 7 Some, some with headings 8 Often, some with headings 9 Sometimes, always with headings 10 Often, with headings

Table 32. Small Multiples heuristics

User Controls Used (nav bar, links, multiple paths, other)	1-10	1 No user control allowed 2 Average access, no paths, few links 3 Average access, no paths, multiple links 4 Poor access, few paths, few links 5 Poor access, few paths, multiple links 6 Average access, few paths, few links 7 Avg. access, few paths, multiple links 8 Easy access, mult. paths, only from start 9 Easy access, mult. paths, mainly start 10 Easy access, mult. paths, mult. Links
Default New Move (minimize mouse)	1-10	1 Never 2 Little, average confusing 3 Little, little confusing 4 Little 5 Sometimes, little confusing 6 Sometimes 7 Often, little confusing 8 Always, little confusing 9 Often 10 Always
- Repeated Banner - Repeated Logo - Repeated Icons (buttons) - Repeated Nav Devices (stay same look, place)	1-10	1 Not used 2 Not repeated 3 Some repeat, different look 4 Often repeat, different look 5 Lots repeat, different look 6 Some repeat, same look 7 Often repeat, sort of same look (or always, diff) 8 Often repeat, same look 9 Always repeat, sort of same look 10 Always repeat, same look
Consistent Graphics (look alike) and Color Scheme	1-10	1 Not used 2 Some consistent, no distinguish 3 Some consistent, average 4 Some consistent, good distinguish 5 Mostly consistent, no distinguish 6 Mostly consistent, avg. distinguish 7 Always consistent, no distinguish 8 Mostly consistent, good distinguish 9 Always consistent, average distinguish 10 Always consistent, easy distinguish

Table 33. Color heuristics

Avg. # Colors (text, buttons, graphics, icons)	2,4,6,8,10 (Integer)	2 30+ colors (or 1 color) 4 20-30 or 2-3 colors 6 15-19 or 4-5 colors 8 10-14 colors 10 6-9 colors
Consistent Color Use	1-10	1 Not used 2 Never consistent, too many colors 3 Never consistent, some colors 4 Some consistent 5 Mostly consistent, too many colors 6 Mostly consistent, average use 7 Always consistent, too many colors 8 Mostly consistent, good use of colors 9 Always consistent, average use of colors 10 Always consistent, good use of colors
Color Use	2,4,6,8,10 (L Label M Measure (quantity) R Reality E Enliven (beauty))	2 No uses 4 1 Use 6 2 Uses 8 3 Uses 10 4 Uses
Background Color	10 (Color)	10 All
Color Scheme	10 (Color Scheme Type)	10 All
Text Contrast w/Background	1-10	1 Same color 2 Almost same color 3 Text lost in background 4 Red and blue 5 Average contrast, small font 6 Average contrast, earth tone or other 7 Avg. contrast, good size font, earth tone 8 Great contrast, other color 9 Great/good contrast, small font, earth tone 10 Great contrast, good size font, earth tone
Color and Movement	1-10	1 No movement and color 2 Too much/too little movement, no color 3 Too much/too little movement and/or color 4 Too little/lots of movement, little color 5 Too little/lots of movement, lots of color 6 Some movement, no color 7 Some movement, lots of color 8 Some movement, little color 9 Lots of movement, some color 10 Some movement, some color

Table 34. Integration of Text and Graphics heuristics

Text and Graphics Combined	1-10	1 No graphics 2 Never combined 3 Sometimes in nav or banner 4 Sometimes combined 5 Usually in banner 6 Always in banner 7 Usually in navigation 8 Always in navigation 9 Usually combined 10 Always combined
Graphical Nav Buttons	1-10	1 No navigation buttons 2 Navigation text 3 Average, hard to figure out 4 Average, average figure out 5 Average w/text, easy figure out 6 Nice w/text, avg. figure out 7 Nice w/text, easy figure out 8 Average, easy figure out 9 Nice, avg. figure out 10 Nice, easy figure out
Text Flow Around Graphics	1-10	1 No graphics 2 Not together 3 Never flowed around 4 Little flow 5 Some flow, too close together 6 Some flow, bit wide 7 Some flow 8 Flowed, too close together 9 Flowed, bit wide 10 Flowed as needed
Deliberate Placement of Graphics with Text	1-10	1 No graphics 2 Not deliberate, alone 3 Not deliberate, separate from text 4 Sometimes, no size, no ALT 5 Sometimes, sized, some or no ALT 6 Sometimes, some sized, ALT or no 7 Sometimes or always, sized, ALT or no 8 Always, sized, some ALT 9 Always, some sized, ALT 10 Always, sized, ALT
-Avg. Ratio Graphics: Text - Ratio Graphics: Text on Main Page	2,4,6,8,10 (0%-100%)	2 100% or 0% 4 81% - 99% 6 1% - 9% or 61% - 80% 8 10% - 29% 10 30% - 60%
Use of Text and Graphics	1-10	1 No graphics 2 Only graphics 3 Too many graphics, no help user 4 Not enough/too much graphics, little help user 5 Not enough/too much graphics, some help user 6 Good/average balance, little help user 7 Not enough/too much graphics, help user 8 Good balance, some help user 9 Good balance, help user 10 Perfect balance, help user

Links Explained	1-10	1 No links 2 Never explained 3 Sometimes (text) 4 Sometimes (text and graphics) 5 Sometimes (text, graphics, lists) 6 Usually (text) 7 Usually (text and graphics) 8 Usually (text, graphics, lists) 9 Always text 10 Always
Interactive Elements	1-10	1 None 2 Little, poor (like just e-mail) 3 Little, average 4 Few, poor 5 Little, good 6 Many, poor 7 Few, average 8 Few, good 9 Many, average 10 Many, good

APPENDIX D. EVALUATION FORMS AND EVALUATIONS

In this appendix, you will find the blank scoring forms that you can use to evaluate other web sites. In fact, I used these same forms when I tested inter-rater reliability, by printing out a copy of the heuristics in Scoring Heuristics and the evaluation forms here for each rater.

This appendix also contains the microscopic analyses of the web sites using the theory and applications from the thesis as the basis behind the scoring for each implementation of a design principle. All discussion regarding good or bad revolves around how well they design to the expectation of a particular category in a particular principle of Tufte's. The final score, from 1 to 10, for each site, is generated by combining the scores from all the categories, using the following table.

Table 35. Overall Score heuristic

Category	Score	Guidelines for Scoring
Overall Score	1-10 (0-390)	1 0 - 40 2 41 - 80 3 81 - 120 4 121 - 160 5 161 - 200 6 201 - 240 7 241 - 280 8 281 - 320 9 321 - 360 10 361 - 390

In this section, you can also find detailed analysis of four web sites from three countries, for a total of 12 web sites that each include scores from a total of five raters (including the author), in order to show inter-rater reliability for these analyses. The raters are as follows:

- R1 – Female in mid-20s. Familiar with web sites, but not confident with computers.
- R2 – Female in early-30s. Not as familiar with web or computers.
- R3 – Male in late-20s. Frequent web site visitor, but not much design experience.
- R4 – Female in late teens. Web site expert.
- R5 – Author (me).

Additionally, I have evaluated 20 more sites from each country. Other raters have not scored these evaluations, and the scores given are all from Rater 5 (me).

Blank Scoring Forms

The following correspond to the same forms used during the evaluation of the web sites. To use the form, type the site name in the first column and repeat that name on the other five forms. Next, go through and mark the score, from 1-10 for each category. You may find it helpful to also indicate other values. For example, indicate the actual number of screens for the main page and then indicate the score. The Overall Impression category is for you to give a score from 1-10 for how well you think the site follows Tufte's principles in general, after having looked at the web site and determined the other values for micro/macro design. This value is not included in the computations for micro/macro, but can be used to check how accurate your assessments are after completing the entire site evaluation.

Figure 3. Micro/Macro scoring form

Micro/Macro

Web Site	Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate	Overall Impression

Figure 4. Layering and Separation scoring form

Layering and Separation

Web Site	Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules

Figure 5. Small Multiples scoring form

Small Multiples

Web Site	User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme

Figure 6. Color scoring form

Color

Web Site	Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Background Color	Color Scheme	Text Contrast w/Background	Color & Movement

Figure 7. Integration of Text and Graphics scoring form

Integration of Text and Graphics

Web Site	Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements

Initial Ford Sites Evaluations

This section provides all the evaluations that I used to determine the types of categories to use and the viability of those categories. The results of these evaluations are summed up in Tufte's Principles Applied to Web Sites.

This analysis supplies several concrete examples of how each principle can be applied to a web page. Also, this exercise shows some of the reasoning behind the scoring rubric. Each of these sites was originally accessible from the main Ford web page at http://www.ford.com and are in that state on the CD-ROM that accompanies this thesis. Tufte's principles guide the tenor of the comments and observations recorded here. At this preliminary point, these observations are mainly first impressions and general experiences from accessing and using the respective web sites while thinking about design. In order to better show the efficacy of this analysis, I analyzed the Ford web sites for more cultures than just Mexico, Korea, and America. This helps to broaden the analysis and better shows any patterns and common designs.

To reiterate, the five principles are as follows:

- Micro/macro design focuses on space use and using the available space to give as much valuable data as possible.
- Layering and separation involves the way that information and graphics are laid out on the page in a way that allows them to interact and create meaning.
- Small multiples help readers to make comparisons between choices and make it easier to understand the design.
- Color use enhances the design and gives meaning to the data when used sparingly and appropriately.
- Integration of text and graphics is essential for an effective information display to allow the reader to more quickly understand the content.

These five principles guide the following analyses of several of Ford's international web sites, presented below in alphabetical order by country name. This initial analysis served to provide information about the specific categories needed for the heuristics and the efficacy of using those categories.

Africa

Ford Africa's site looks a lot like a template that has been created to help that area's webmaster to maintain the Ford company's site look and feel, maintain consistency, and make it easy for the webmaster to create the Ford-style web pages. Because of this, it is hard to analyze this specific web page since it is not necessarily unique or designed by a specific culture. However, the fact that Ford is concerned and mindful of international customers in Africa speaks well on the company's behalf for the page design. At the least, they have provided a specific page for this culture instead of just making users go to the same page as that for American users. Presumably, the company has prioritized which cultures would provide the highest return on investment for a designed web site, and does not feel inclined to expend resources on a site that has relatively few cultural Internet users. Instead, they only provide links and contact information.

The general design of the Ford African web site is a base template that is obviously used to merely set up a generic, all encompassing web site. Specifically, the design is the same as some of their other sites, as can be seen from the different colors on the left-hand side of the page with the Caribbean, Central America, South America, Europe, Middle East, Asia-Pacific, and Africa links. By clicking on each of these links the users are taken to similar-looking web sites (except in a few cases where Ford web designers have actually created unique country-based designs). It is directly obvious that Ford does not want to impose the Americanized version of web design on different countries, therefore they use a template. This is not necessarily because they lack web designers or the money, but because they also do not want to offend anyone or lose any potential customers. The main focus of the site is a spinning globe on the upper right hand corner of the page, which serves to emphasize their worldwide presence.

Each of the countries or world areas listed on this template use this same main entry page. The large heading in the upper left corner serves to remind the user that they will find information about the worldwide direct market operations and not necessarily information about dealers or the status of Ford in a particular country. The collage of pictures is an example of how layering and separation can be used to create context and information spaces. The pictures are layered together to create a feeling of unity and yet to separate the various countries by showing bits and pieces of scenery from each one and also showing different kinds of automobiles that Ford makes. The designers use the middle left-hand side of the web page to list the many different countries by using a rectangular box, each with its own color, thus adding to

the small multiples design. When clicked on, a drop-down list is brought forward showing different countries within each region. From here the user can choose to find more information about Ford Motor Company in a specific area.

As mentioned previously, color is used within the different rectangle boxes of where the country names are contained to help us differentiate their color. This is also used in the collage where all the cars are shown to create a sense of reality and realism. The site uses a simple white background with dark, bold, black text to highlight the important messages. Near the bottom of the page they have some light blue text that integrates well with the pictures and the other colors of the boxes. There are no explanations about what clicking on a certain area or box will do. However, it seems fairly understandable in the context of going through the Ford web site that users will get information about different countries. The page has been separated into several distinct areas, with a combination of text and graphics. However, they are only on one side or the other and not interspersed within the text. There is probably an equal ratio of text to graphics on this page that helps to draw the eye and to interest the reader.

Interaction is achieved with a spinning globe, the user-initiated drop-down list of countries within specific regions, and the realism in the online pictures.

America

The designers of this site include the company logo and an image of one of their vehicles (the vehicle type changes every time the page is accessed) on the main page in an attempt to provide lots of information in a small amount of space. However, the prominent “World Wide Connection” text effectively hides the “Ford” text and graphic, making it hard to distinguish on first glance what company this site is for. However, the Ford logo is consistently displayed near the top of every page, so once users know about it, they will easily recognize it later. Page headers are also used to let the reader know where they are in the structure of the web site. A consistent design of oval-shaped graphics is used throughout most of the web site to aid the reader in finding information and confirming that they are where they intend to be. The use of text links at the bottom of each page that mostly correspond to the graphical links above, create a sense of unity and cohesion. The designers have also included a site map that shows the overall structure of the site.

Similar bits of information are grouped together into manageable chunks throughout the site. The bits become paragraphs further down in the site hierarchy, where the information is specific, so no

generalizations are made anywhere else. Also, on the home page, the designers have layered the oval graphics into an oval formation that takes the eye from left to right then right to left. The text links are separated from the rest of page by the use of a horizontal rule. The text links themselves are further separated from each other by a vertical character ("|") and a space. Menus and lists are mostly designed in a vertical layout to the right of the page, leaving the left side for important information that users would be interested in. Equally important in the layering is the fact that the page lengths are all aimed at staying within one screen so that the user does not have to scroll. This also creates effective scan zones along the right side and the bottom of the screen for easy navigation by the reader and to find important information.

The designers use repeated oval shapes and the reoccurrences of the page headers within the oval buttons to tie together the site and navigation. However, they are not consistently placed within a certain area, so they are sometimes hard to find, and the reader can get confused and select a link that goes to an unintended location. Although it is not obvious from the black and white figures used in this thesis, blue is used as a common color throughout the web site.

All of the graphics use bright colors that stand out from the page. Not only is this overwhelming for the reader, but it also is confusing and makes it difficult to pick out appropriate links. However, the use of bright colors in the auto graphics is helpful, as it gives the reader a better picture of what the vehicles look like. They use color for realism and to help the user to feel for what the site is like. The images are consistent across the site within each section so end-users are familiar with how it will look and the changes in color and size of images let the user know where they are in the web site structure.

Text and graphics are integrated within each of the images, with the text explaining what the image is. For the most part, any text within a graphic seems to be layered on top of it, floating. Words of information are separated from the graphics by white space and vertical lines, so that most information is accompanied by, at most, one or two graphics. The use of marquee text occurs only on the first page and is situated in the lower right corner so as to draw additional attention to itself, probably unnecessarily.

In any event it is obvious that a lot of planning and design consideration has gone into the creation of the Ford America site, trying to make it easier for users to access, use, and manipulate the information they need.

Argentina

Argentina's site is as creative and innovative as the American site. They did not rely on a boilerplate or templates, although they do maintain the use of the Ford logo graphic and the basic site setup. This design is much different from the American site. From the first page, with the flying text, they create interaction and interest in the user. Then the main page automatically loads and makes the user feel like they are behind the steering wheel of a car. Different parts of the steering wheel take the user to different areas of the web site. These paths are clearly marked and are easy to find. And when the user runs their mouse over the text area, that graphic changes to a brighter color to let the readers stop and see where the link will go.

The Argentine web site is definitely different from the American web site. They also use a micro-macro structure with the main topics indicated on the sides of the right and left of the steering wheel. The site is very busy with lots of flashing lights and moving images that draw the reader in but can also confuse them. They use the metaphor of a steering wheel to indicate that the user can navigate through the site with the same familiar ease as driving a car. There are relatively few links on the main page keep it simple and easy for the user to navigate. So the information is chunked together. They continue the metaphor throughout the web site with a dial on the left-hand side of the screen showing each of the major sections. And clicking on one of the names, in effect turning the dial, moves the user to that area. They also use the same images throughout the web site, drawing continuity and helping the reader to know where they are. Another tactic is to highlight the name of the section where the user currently is, to help them keep track of where they've been and where they are in the site structure.

The web designers have definitely used realistic color throughout the web site. This helps entice the reader, however the flashing colors and moving pictures may distract from the overall message and could turn away some viewers. Text is used within many of the graphics as opposed to being separate from them, and there are no textual links. Instead they are all found within the graphics themselves, which can be confusing to the users. It can also cause a problem if a user turns off graphics display and then they would just see a blank page.

Australia

Australia's site makes use of the dark blue color consistent throughout the other international web pages of Ford. They feature a dark blue background and instead of the Argentine steering wheel, the designers present users with a speedometer that has different sections of the site represented as different levels on the speedometer. Although it is unclear whether the higher-placed links are more important or not, when the user runs their mouse over a specific area, the speedometer needle rises to that level, which causes the user to stop and look at the resulting text more carefully.

Brazil

The main page for Ford Brazil presents a different image than most of the other international Ford sites. This site does not try to use the car metaphor for navigation, and the setup is rather straightforward with links on the right and the image in the middle. As the user explores the site further, it is evident that this site has borrowed graphics and possibly layout from the English (American) web site. The site was not designed by an employee of Ford in Brazil, as shown by the email address at the bottom for webstudio@originet.com.br: a Brazilian web author designed the site for the benefit of Ford.

The only consistency through the site is the repetition of the Ford logo and the background color in the top frame. Neither does the site offer a site map – although, the initial list on the right could be considered as such since the site is not much more complicated than that. There are at least two moving, distracting elements on the first page: one in the upper right and one in the lower left of the screen. Since these are important main viewing areas, the design may interfere with the intended message delivery. The list items also change when a mouse cursor is pointed at them. This level of interactivity may be to the detriment of the customer. Color is used for reality in the pictures of the automobiles, but other uses do not serve any meaningful purposes.

France

The French site seems to follow the same basic site structures as both the Dutch site and the German site – even using the same basic images for both the first page and the main content page. The only sources of continuity in the site come from the repeated Ford logo, the use of a black background, and the side links that are a part of a static frame. They do provide a link to a site map, which can aid the reader in finding their way through the site. However, instead of plain text, the user is forced to load images of text

that makes the page loading time fairly lengthy. There is not a central theme or metaphor in the site. The site map suggests a universe metaphor, but this is not carried through to any other part of the site.

In attempting the draw the reader in, the web designer of this site provides an abundance of visual stimulation. This is, in fact, too much for the reader to handle, as it distracts from the link list on the left side of the screen. The link list only makes subtle changes as a reader moves the mouse pointer over a specific item. Colors have no specific meaning in this web site. They are used more for flash than for any aid to the user in understanding the web site.

Germany

Although the German web site is similar to the French and Dutch sites, it uses unique images on its opening screen that effectively draw the reader in because of how they are layered and separated. Even the building of them together as small multiples creates a bigger overall view or picture. However, once the user accesses the main content page, the look and feel are basically the same as for the French pages, the main difference being that the site map is called a “surfguide”.

Japan

The Japan site uses a lot of graphic and textual continuity throughout the site to help the reader remember where they are in the site structure. On the main page, there is a list of sections that are shown as both a graphic and as text. These graphics and text are repeated within each section, as well as being available on the left side of the screen in a table of contents throughout the entire site. The metaphor of the tree created on the main page is not followed through with on any other pages. The site map is actually just a text index that supplies the same information as the left-side links. Although it provides redundancy, the level of detail is not sufficient enough to help the reader gain any new information not already contained in the left-side links. Color is used effectively in the background to provide a unique contrast with the white and light green. The other pages use a white background with a blue border to highlight the table of contents. Words and graphics are integrated into one whole for an English audience. The main focus seems to be on the English, with only brief explanations in Japanese. Thus, the intended audience seems to be those who can speak English. This appears strange since it is Ford’s site for the Japanese people, instead of a Japanese company’s site for Americans.

Korea

The Korea site is found under the Asia Pacific region section of the same page that is used to access the Africa site. It is inferred that they either do not have any major offices there, or they do not have the resources there to create a culture-specific web page.

Mexico

The splash page idea seems to be popular among many of the Ford sites. The Mexico splash screen does a good job of giving a quick peek at the site while also giving the user a few options on where they would like to go within the site (special vehicle team, main Ford Mexico site, or the Lincoln site). The layering of the images in a collage style is attractive and entices the viewer with images of reality and the small amount of movement that takes place.

The main site tries to create a dashboard feel with the moving text about the "dashboard" that houses a working digital clock. The metaphor is carried out through the site in various ways which help the reader recognize where they are in the site structure and to provide consistency in navigation. However, there may be too much interactivity on the main page since there are things to draw the reader's attention away from the main menu: the Ford logo in the upper left area twinkles, the text in the upper right scrolls, the clock on the right changes every ten seconds, the credit block in the lower right corner twirls around, and the automobiles in the center change every few seconds. The only interaction for the menu is when the reader moves the mouse pointer over a word and it becomes highlighted. There is no rhyme or reason to the color of highlighting used.

The secondary and subsequent pages of the site all have an index bar at the top of the page that helps the user navigate the site. It is always accessible site in its own frame and doesn't scroll out of view when the content section is scrolled. This allows for easy navigation and adds to the site's layering and separation.

Netherlands

The Dutch site is the same as the Germany and Spain sites with the splash screen and the main page. The only differences seem to be in the number of links on the left, and what images are used on the splash page, which change each time the page is loaded, based on what time it is.

Spain

The Spain site actually starts out with a very different looking splash screen from the Dutch or German sites. Although the splash page provides essentially the same function as the others, it also gives the dealer name and address information, and then quickly loads the site's main page. The rest of the site is very similar to the Dutch and German sites.

Taiwan

The Taiwan site also features a splash screen where the user can select to enter the site based on which web browser they use. This could easily be done through a script in the web page, so it is not obvious why they have chosen to use this method. Designers do take the opportunity to create a car metaphor with a turning key image; however, the metaphor does not continue through the rest of the site. The web designers have used frames to help separate the index from the content. The index links interact with the user's mouse pointer: an arrow appears next to the link when a user moves the mouse pointer to each link.

Venezuela

There is not a site metaphor for the Venezuela site, but it is still very different from the other Ford sites. There are relatively few graphics in the site and not a lot of animation. The main links are all text and appear at the bottom of every page. No explanations about the links are given. It is up to the user to find a path through the site. There does not even appear to be a site map available for this site.

American Sites Microscopic Analyses

I selected 24 American automobile dealers and manufacturer web sites for this study. I tried to select popular sites as well as those that were not well known so as to get a better sampling of the range of sites and designs out there. The sites discussed here that have had multiple raters are Buick, Chrysler, Ford, and Mack.

ACDelco

The ACDelco site is available at http://www.acdelco.com/index.htm. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However,

the site is fairly consistent with its own style and design. That consistency helps to make it one of the better sites with Tufte's principles, although definitely not one of the top 10 sites in the group.

The scores for ACDelco are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	6
Consistent Theme	6
Consistent Site	7
Page Titles	8
Space Well Used	5
Avail of Navigation	10
Languages	2
Languages Separate	1
TOTAL	54

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	7
Deliberate Placement	8
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	6
Links Explained	4
Interactive Elements	7
TOTAL	60

Layer and Separation	Score
Site Map	6
Search or Index	8
Simple Background	10
Important First	8
Headings Used	7
Chunking	9
Horizontal Rules	10
TOTAL	58

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	9
TOTAL	59

Small Multiples	Score
User Controls	10
Default New Move	9
Repeated Banner	9
Repeated Logo	10
Repeated Icons	4
Repeated Nav Devices	8
Graphic Color Theme	4
TOTAL	54

The ACDelco site does a good job in each of the five principles, while not necessarily doing great in any one area. The site also did not receive many low scores, only getting a single 1, one 2, and four 4s.

The home page is about one and a half screens long, but the navigation and most of the important information is contained in the first screenful. The designers do use a consistent text link menu at the top of every page after the first to take the user to any other main section. The links are easy to access and to understand. Announcements, like the chat session, are given priority by being placed just below the title graphic. This allows them to be seen easily. The bottom half of the page has links to copyright and

trademark information, as well as a link to email the Webmaster. These are low priority items, and so can remain effectively below the “fold”. On the plus side, the simple, white background helps users focus on the content and does not cause any distractions. The designers use horizontal lines often to separate content and headings and foot matter. The header graphic even has a horizontal line below it on most pages. This is unnecessary since the table-like graphic already forms a separation, so the horizontal line in these cases is actually redundant. The entire site uses lines, and especially squares, to create chunks and to separate information. Viewers are able to continue through the site fairly well, though. The design makes good use of a repeated corporate logo to brand the pages and to let viewers know that they are still in the same site (which is good because the graphic and color scheme are not consistent enough to help). The page banners and navigation are also repeated consistently, though the design is not always the same. This could cause a little confusion or hesitation for users. The designers have also created a nice, open site that lets the user choose their own path and easily follow links. This is equally true for giving the user an easily identifiable new move option that often does not require much extra thought or mouse movement. Unfortunately, the designers do not take the opportunity to repeat icons or a design motif to maintain a consistent look and feel in the design. This may detract significantly from the user experience with this web site.

Of all the principles, the ACDelco site does the best with using color effectively in the site. The site uses an average of 6 colors throughout the entire site: red, blue, white, black, purple, and yellow used fairly consistently. Other colors are used in graphics occasionally, but they are almost always shades of one of the above (especially shades of blue). However, the colors used have nothing to do with the text that they are used with (except for blue and purple for links). It is hard to find any significant correlations between why a color is used, specifically with why text is either black or white (apart from the fact that it has either a white or black background, respectively). Even though the designers mainly use either black or white as a background color, in these cases the text color is almost always the opposite color, so they contrast fairly well. There are lots of moving parts in this design, some of them only initiated by the user when they run the mouse pointer over a certain area. While this makes the site feel more interactive in some ways, it can be a bit distracting and disconcerting at times. On average, the ratio of text to graphics is about 50% across the entire site – a nice mix for this type of site. The front page is a bit to graphic-heavy (90%) and slows the

initial page load time, but is still usable to some extent since they have provided a web map text link that users could navigate instead of waiting for the graphics to finish loading.

The use of pictures of auto parts on the search square helps to reinforce that the search is for products and not the web site. However, it is hard to figure out where some of the boxes will lead because the words are unclear and either too generic or too involved with the site's jargon. Although the design uses a good ratio of graphics and text, many of the graphics seem out of place and unnecessary, like the lightning images on the "Hot Stuff" page. Links sometimes seem superfluous as well, although this is more due to the limited use of explanatory text than to the overabundance of provided links. For example, the "The Catalog" and the "The Clothes" links on the "GM Performance Parts" page are a bit vague. They can even be a bit confusing since they link to text further down the page that explains what they are. It would be better just to leave out these links and bring the content up to the top of the page. The links are meant to add interactivity, which they accomplish to some extent, but far more could be achieved if the site seemed more interactive with the user's need for information. Pages containing the search function, parts catalog, and corporate history could be tightened up significantly to seem more interactive. Additionally, there are no links or translations anywhere on the site. Although the design is fairly easy to understand in general, they use lots of terminology that may be hard for those who speak English as a second language to understand (like "Web Map" and colloquialisms like "pop your hood").

The ACDelco site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 281 out of a possible 390 points. This puts the site on the line between an overall score of 7 or 8. It gets the 8 because it scores fairly consistently across all five of the design principles. It's strengths lie more in layering and separation, small multiples, and color. It also falls very close to the median score for all American sites, 280. This shows that it is indeed quite average. Interestingly, it also falls at the median (281.5) and the average (280.27) scores for America and Korea together (Mexican sites have a lower average score that brings down the combined numbers to 270.68 average and 267.5 median, so overall, the ACDelco site is above the global average and median).

Buick

The Buick site is available at http://www.buick.com. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site scores well in

organization and placement of navigation, graphics, a repeated logo, and interactive elements. That consistency helps to make it an average overall site.

The scores for Buick are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	10	0
Site Purpose	1	3	2	1	1	0.75
Consistent Theme	6	7	9	8	8	-0.5
Consistent Site	7	6	10	7	7	0.5
Page Titles	7	7	7	7	7	0
Space Well Used	8	8	10	8	8	0.5
Avail of Navigation	9	9	10	10	10	-0.5
Languages	2	2	2	2	2	0
Languages Separate	1	1	1	1	1	0
TOTAL	51	53	61	54	54	0.75

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	8	8	9	8	8	0.25
Search or Index	8	8	8	8	8	0
Simple Background	9	9	9	9	9	0
Important First	8	8	10	10	10	-1
Headings Used	8	8	9	9	8	0.5
Chunking	7	7	9	9	9	-1
Horizontal Rules	8	7	7	7	7	0.25
TOTAL	56	55	61	60	59	-1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	6	7	7	7	7	-0.25
Default New Move	7	4	5	5	5	0.25
Repeated Banner	6	6	10	6	6	1
Repeated Logo	10	10	10	10	10	0
Repeated Icons	3	2	3	3	3	-0.25
Repeated Nav Devices	7	7	9	7	8	-0.5
Graphic Color Theme	4	4	9	4	6	-0.75
TOTAL	43	40	53	42	45	-0.5

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	10	8	8	10	10	-1
Consistent Use	8	6	10	8	8	0
Color Used	6	6	10	6	6	1
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	5	5	5	5	5	0
Color and Movement	10	10	10	10	10	0
TOTAL	59	55	63	59	59	0

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	9	9	9	9	9	0
Graphical Nav	7	7	7	7	7	0
Text Flow	7	10	10	10	10	-0.75
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	6	6	6	6	6	0
Ratio G:T Main Page	4	4	4	4	4	0
Use of Text and	4	5	5	5	5	-0.25
Links Explained	7	7	9	7	7	0.5
Interactive Elements	8	5	10	10	8	0.25
TOTAL	62	63	70	68	66	-0.25

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	271	266	308	283	283	-1

Similar to the ACDelco site, Buick's site is a fairly consistent one that received generally average scores in each of the five principles. Although the site scored somewhat poorly in the small multiples principle, the site did receive a fairly significant number of 10s and only a few relatively low scores.

The first page a user sees upon entering the Buick web site succinctly shows the scope of the site in about a screenful of information. This helps users to figure out the site easier. Spacing is used to separate content and to tie elements together in a pleasing way that draws the eye. This is especially prevalent on the LeSabre set of pages that combine navigation and information is nice contrast to each other. The company logo is used on a handful of pages to identify the site and to try to tie things together. Additionally, the white text with black border navigation graphics is fairly common on most pages, even though it is unclear why some of these text graphics have backgrounds and others do not. It is always easy to get back to a previous page or to the main page from anywhere in the site. Although the site does fairly well in these areas, there are no links to other languages or cultural sites.

Layering and separation is one of the site's strongest points. The site map provides good navigation through a complex web site. It is sufficiently detailed to allow a user to get to the main section where the information they need is located. So, the real content is usually still a few clicks away. Similarly, it takes two clicks from the home page (potentially three since the user may have to scroll down to the second link) to get to the site map. No search functionality is provided for the site, but the site map serves as a fairly good index of the content. The designers do a great job with organizing the content so that the important information is at the top, and they use the design to guide the reader to the appropriate

information. For example, on the home page, the company logo is prominently displayed at the top left of the page, with nothing else at the same level on the top of the page. Therefore, the reader's eye goes to the next level of information on the left of the page, which specifies the various sections of the site. The bottom level of the page shows the main navigation that stays in that general location throughout the site.

The site also makes decent use of color to highlight the data and to enrich the site. There is an average of eight colors used throughout the site: blue, white, black, orange, yellow, gray, red, and green. They are used fairly consistently through the site to help viewers. Orange is used mainly in the horizontal rules, white is either background or text headings or links, black is standard text and backgrounds, blue is the corporate color and is used for backgrounds and a lot in graphics, yellow is not used very consistently except that it's often used in photos and other graphics, gray finds use in backgrounds and navigation, red is used for emphasis or to highlight vehicles, and green is used much like red. The designers do a great job with incorporating the right amount of color and movement to draw attention where necessary. This is especially prominent on the main page for the site. Moving the mouse cursor over the main section links changes the main image to the selected type of vehicle. Graphic use is also above average for all Mexican and American sites, while being on the average for Korean sites. The graphics are always placed explicitly on the page with the text, in ways that bring out the content and emphasize important features. The designers use helpful Alt text, as well as sizing attributes, to make sure the design is consistent. On the Site Guide page, graphics help separate the body text into layers since the graphics are used as headings for each section. The designers also do quite well with spacing the images and text so that they interact well with each other but don't overpower or confuse. On the Site Guide page, each heading defines the section, without interrupting the flow of the text and the flow of reading. But, even though the spacing between paragraphs is basically the same as the spacing between sections, the graphics are close enough to make the delineation quite easy. Their excellent use of graphics is also their downfall, as they use a great percentage of graphics as opposed to real text (text in graphics is counted as mostly graphics since the Internet protocol can't tell a difference when it delivers the graphics to the viewer's browser). An average of ratio of 8 to 1 favoring graphics is inexcusable. The 90% usage on the main page can be understood since the designers want to create a page that is enticing and rich, but there are many other ways to accomplish this without making everything a graphic.

Repetition of design elements happens most within the sections of the site, rather than across the sections. The design only uses a repeated banner unique to each section, rather than a site-wide banner. However, the company logo is always repeated on every page, whether as part of the main navigation, or in the header for the page. Since the design uses few icons, this could be a great opportunity to use repetition to help users get familiar with them, but the design does not give the icons consistent looks from one page to the next, even within a section. Navigation devices are also repeated consistently within each section of the site (this is done with the use of frames so that the navigation is usually always visible, and so that it is easy to modify). As with everything else about the design, it is fairly consistent within the sections. However, this is not always the case. Sometimes a navigation link opens new content in the document frame, but other times it breaks out of the frames and presents it in a frameless environment (the Calculator link on the Riviera pages). Some of the sections start with an introduction sequence, while others go straight to the main page (Riviera versus Century). And, of course, the theme of each section is fairly consistent, although there is no tying between sections. Unfortunately, the site does not state it's purpose or why you'd want to use it, so it is difficult to identify if the theme and purpose are tied well.

The Buick site designers create a fairly consistent site that does an average job with the application of Tufte's principles. The site scored a total of 279 out of a possible 390 points. This puts the site on the line between an overall score of 7 or 8. It gets a 7, however, because it falls short in small multiples and in the overabundance of graphics. The site does fare well with page length, keeping navigation accessible, organizing content so the important information is first, placing graphics so they flow well with the text, and putting color and movement to good use. As with ACDelco and others, it also falls very close to the median score for all American sites, 280. This shows that it is indeed quite average. It also falls at the median (281.5) and the average (280.27) scores for America and Korea together (Mexican sites have a lower average score that brings down the combined numbers to 270.68 average and 267.5 median).

Cadillac

The home page for Cadillac is available at http://www.cadillac.com. It uses an average design to convey its message and data. The site uses a great background and has excellent chunking. It is also consistently above average in most other aspects of design, which helps to keep it rated high even though the design doesn't excel in more areas.

The scores for Cadillac are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	1
Consistent Theme	8
Consistent Site	7
Page Titles	9
Space Well Used	8
Avail of Navigation	8
Languages	2
Languages Separate	1
TOTAL	54

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	7
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	8
Links Explained	3
Interactive Elements	5
TOTAL	60

Layer and Separation	Score
Site Map	1
Search or Index	6
Simple Background	10
Important First	9
Headings Used	8
Chunking	10
Horizontal Rules	7
TOTAL	51

Color	Score
Avg. # of Colors	10
Consistent Use	8
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	3
TOTAL	55

Small Multiples	Score
User Controls	9
Default New Move	9
Repeated Banner	7
Repeated Logo	7
Repeated Icons	6
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	55

The Cadillac site starts with a splash page – a common technique that uses a company logo or other similar identifying graphic – that the user then clicks on to enter the actual content of the site. Some splash pages automatically load the next page so the user doesn't have to click, but here, the user must click on the graphic to load the next page. Splash pages are almost always one screen long. Interestingly enough, the next page on the Cadillac site is only about one and a quarter screens long and merely provides links to the main sections. It seems like the designers could have gotten rid of the splash screen and put that same graphic on the main page along with the section links. The site does not state its purpose, and that contributes to the fact that the theme is only maintained on the first page and not through the rest of the site. However, the site is sort of tied together within each section and between the "tools" part of the site (the

"Sponsored Events", "Privileges of Ownership", and other tools). As with the other sites reviewed so far, the Cadillac site doesn't offer any translations or links to similar sites for those of another culture. The Cadillac site does slightly above average overall with cross-cultural design, which earns it a high 7 overall score.

The designers chose to use a simple white background through most of the site to keep readability high. The plain background color and scheme provide for lots of places where color could be used effectively. And yet, the designers do not get carried away and use too many graphics. On average, they use six colors consistently throughout the site: white for background, black for text and auto graphics, gray for lines, blue for links and corporate images, red for emphasis, and turquoise for use with graphics accompanying some subheadings. Although the colors are not always used in these ways (the auto graphic for the Eldorado is red and stands out remarkably from the other images), the designers usually followed these uses of reality and to enliven so that the user knows quickly what to expect, color-wise, on any given page. The white background and black or dark text contrast well although the light blue and pink graphics tend to blend in with the text in several places. Also, since the heading text and all section links are always graphics, the text always appears a bit fuzzy. Different colors and/or using real text outside an image for these things would alleviate this problem somewhat. It would also aid the reader in determining where to go or what was important if the designers had incorporated much more movement with the design. As it is, only the links provide any movement for the user in the form of popup text that merely reiterates the link word or words.

Using real text for these headings and links would also help the site's integration of text and graphics more. The main page is composed mostly of graphics (about 65%) and so takes too long to load on a slow connection. The designers seem oblivious to this, as evidenced by their addition of the 100% graphic splash screen. At least the ratio on the other pages is a bit lower (more in the 60% range, which is on the high end of acceptable for a score of 10 in that category).

The category for the combination of text and graphics should probably differentiate between combining text into graphics and the using of graphics to enhance the content. But, since that distinction was not made prior to the scoring for this study, I'll leave the scores as they are for now. In any event, the scores are balanced by those for text flow around graphics since graphics-intensive sites would naturally

not have as much flow as other sites. So, the Cadillac site gets a good score for combining the two, while not doing as well on the category for the flow. In all, the design has a pretty good balance between text and graphics in a way that sometimes helps the user (the use of graphics for the navigation bar is one that does not seem to have any good reason for its use).

The site does not include a site map as far as a separate page, but it does appear that the main page functions as a kind of site map, providing links to the main sections of the site. Of course, the main page does not contain the second-level links that would make up a true site map, but at least the main sections are represented here. However, the designers have not included any search functions, nor have they created an index to help users with finding information. But, since they usually put the important information is highly visible locations on the screen, the user can at least find the information on a page a bit easier. This is especially true of the main page, which is valuable since it must also function as the site map. The designers have also done well with separating the site into meaningful chunks of information. Many other sites do this as well since it is easy to separate a site along product model lines. This can cause problems with organizing the "extra" stuff that the site provides in the form of "How may we assist you?", "Interactive design studio", "Sponsored events", and so forth. The designers for the Cadillac site keep these links separated from the links for the models on the main page so that they don't confuse the user. However, the links are all mixed together on secondary pages. For example, the Catera section has links to each subsection and the extra stuff at the bottom of the page.

The Cadillac site designers create a fairly consistent site that does an average job with the application of Tufte's principles. The site scored a total of 275 out of a possible 390 points. This puts the site at a high 7 because of its consistency and simple design. The site does especially well with the average ratio of graphics and text, average screen length, and chunking. As with ACDelco and others, it also falls very close to the median score for all American sites, 280. This shows that it is indeed quite average. It also falls near the median (281.5) and the average (280.27) scores for America and Korea together (Mexican sites have a lower average score that brings down the combined numbers to 270.68 average and 267.5 median).

Chevy

The Chevy site can be found at http://www.chevrolet.com. The site scores similarly with the ACDelco site, with its best design occurring in its consistent theme, easy-to-use navigation, and arrangement of information on the simple background.

The scores for Chevy are as follow:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	1
Consistent Theme	10
Consistent Site	7
Page Titles	8
Space Well Used	5
Avail of Navigation	10
Languages	2
Languages Separate	1
TOTAL	54

Text and Graphics	Score
Combined?	9
Graphical Nav	6
Text Flow	10
Deliberate Placement	10
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	9
Links Explained	8
Interactive Elements	7
TOTAL	73

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	10
Important First	10
Headings Used	7
Chunking	9
Horizontal Rules	2
TOTAL	52

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	4
TOTAL	56

Small Multiples	Score
User Controls	7
Default New Move	5
Repeated Banner	6
Repeated Logo	9
Repeated Icons	8
Repeated Nav Devices	6
Graphic Color Theme	6
TOTAL	47

The total for micro/macro for the Chevy site is exactly the same as the three other sites ahead of it alphabetically, at 54. All of these sites would have done much better if they had incorporated a set of sites for viewers from other cultures. Perhaps the reason that these sites don't do this is because they also don't have a definite site purpose either on a separate page, or even implicit in the site itself (ACDelco is the sole

exception so far, and very few of the remaining sites make this mistake even if they only have an English version of the site).

The main page is about one and a quarter screens long. However, the site also uses a frame on the bottom of the screen that contains the main links. Everything below the first screen is copyright information and not necessarily important to the user of the site. The designers call this site the “Chevy spot”. And though the implications of the name are not immediately apparent, this site does have lots of information related to Chevy automobiles. The chosen theme is repeated across all the main layers, and where the sub-layers diverge in design, they maintain a sense of consistency with the rest of the site with the consistency of the framed navigation links and a consistent use of colors. For example, the Chevy Tracker section uses black for text and blue as a link highlighter (not only on link text, but with link graphics as well). However, because there is no defined purpose, it is difficult to know whether the site’s design is tied to the purpose. The designers of the Chevy site use an average of 8 colors: black for text, blue for highlighting links, green for subsection links, red for highlighting and vehicle names, yellow for vehicle names, purple for the “spot” and to highlight links, white for background, and gray for the corporate logo (as outline at least). However, the colors are not always used consistently, like the use of two colors for vehicle names (actually a gradient of color in the list) and the use of red for links in the Motorsport section. Unlike the other sites so far, this one uses color to show reality and enliven, but also to label, as the links on the main page show.

The white background and black text are a fairly good contrast for the site. Sometimes the text is white on black, red on black, or white on blue, but these only show up in a couple sections. And these contrasts are also fairly reasonable, in any case. The designers shine in the integration of text and graphics, scoring a 73, which is a tie for the highest score for this category among American sites, and tied for fifth highest overall. The parts of the design that keep this site from being number one are the high percentage of graphics on the main page (including graphics of text), and the predominant use of text navigation where some include graphics but that need text because they are not immediately obvious. Additionally, the designers could include more and better interactive elements apart from the interactive links in the Tracker section, the simplistic Flash introductions to the Silverado section, and the Dealer Locator search facility. The designers usually explain links so that the user understands what to expect from a given page. This is immediately apparent on the Features page, where every link has a short paragraph that describes it.

Although the designers "cheated" by including text in most of the graphics, the design still works because the text is separated enough from the graphics that the text references. As well, the design uses as average of 60% graphics to 40% text. This is on the high end of the desired range, but it works well for the site in maintaining spacing and flow.

Perhaps one reason that the site seems unstructured with regards to white space is the lack of horizontal rules to separate and layer information. The main page has rules under a few links at the top of the page and under the graphical section links. These are about the only rules for most of the site. The Flashback and Brands sections don't have any rules (except for underlined links, but these aren't used to layer or separate).

The Chevy site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 282 out of a possible 390 points. This puts the site at a low 8. It gets the 8 because it scores fairly consistently across all five of the design principles. It also does a great job with integrating text and graphics. So, though it does not do as well as the other sites reviewed so far in other categories, its strength helps it to score very close to the median score for all American sites, 280.

Chrysler

The Chrysler site is available at http://www.chryslercorp.com. The site has a better than average design that makes consistent use of the design principles discussed in this thesis. However, the site not perfect, and could use a few touches here and there to strengthen the user's experience.

The scores for Chrysler are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	10	0
Site Purpose	1	1	2	1	2	-0.75
Consistent Theme	7	7	7	7	8	-1
Consistent Site	6	8	9	9	7	1
Page Titles	8	8	8	8	8	0
Space Well Used	7	5	5	5	5	0.5
Avail of Navigation	10	10	10	10	10	0
Languages	10	10	10	10	10	0
Languages Separate	10	10	10	10	9	1
TOTAL	69	69	71	70	69	0.75

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	5	5	5	5	5	0
Search or Index	8	9	8	8	8	0.25
Simple Background	8	8	8	8	8	0
Important First	8	9	8	8	8	0.25
Headings Used	8	8	7	8	8	-0.25
Chunking	9	9	9	9	9	0
Horizontal Rules	9	7	7	7	7	0.5
TOTAL	55	55	52	53	53	0.75

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	6	6	6	6	6	0
Default New Move	9	9	9	9	9	0
Repeated Banner	8	10	10	10	10	-0.5
Repeated Logo	10	10	10	10	10	0
Repeated Icons	8	9	7	10	9	-0.5
Repeated Nav Devices	10	10	10	10	9	1
Graphic Color Theme	8	7	8	9	9	-1
TOTAL	59	61	60	64	62	-1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	10	10	8	10	10	-0.5
Consistent Use	9	9	8	9	8	0.75
Color Used	8	8	8	8	8	0
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	8	8	8	0
Color and Movement	8	9	8	8	9	-0.75
TOTAL	63	64	60	63	63	-0.5

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	10	10	9	10	9	0.75
Graphical Nav	5	4	9	9	6	0.75
Text Flow	10	10	10	10	10	0
Deliberate Placement	7	7	7	7	7	0
Ratio Graphics: Text	10	10	10	10	10	0
Ratio G:T Main Page	4	4	4	4	4	0
Use of Text and	7	7	5	7	7	-0.5
Links Explained	7	7	7	7	8	-1
Interactive Elements	8	8	7	8	8	-0.25
TOTAL	68	67	68	72	69	-0.25

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	314	316	311	322	316	-0.25

The design's strengths are in micro/macro design and integration of text and graphics, where the designers do excellently with navigation, language and culture pages, and text flow around graphics. Its weaknesses are in defining its purpose, a useful site map, and the ratio of graphics on the home page.

The purpose of the site seems to be displaying the “Even our history looks forward” phrase. However, the site doesn’t really support this statement because there is no way to find out the history from the links given on the home page. Also, the site only makes average use of space to bring the design together. The extra white space that occurs on the home page because of the needed space for future content from the header links should be replaced with text describing the site’s purpose and what the user can expect. This would also lower the page’s overall ratio of graphics and text, and bring it more in line with the accepted range of 30%-60%. The designers could also do a bit better with placing the graphics better, as well as giving each one some alt text so that they display better. Given that the main page is so graphic-intensive, some users may turn off graphic loading in order to get to the content quicker. But, since the graphics don’t all have alt text, this may not be possible to do effectively. There is space in the middle of the page that isn’t used for anything until a user selects one of the links at the top of the page, after which content fills the area.

The site uses a splash screen to show the history and then the main page is kept to a single screen (almost half a screen actually) so that the information is easy to locate within eyespan of each other. The main navigation is consistently available in the same location and with the same design as on the main page. This is especially evident when selecting the links that appear at the top of the main page, since they merely replace the empty area with content and links specific to the section. The main page includes a link to the Global Gateway, where users can select a web experience specifically for their culture. This helps users to fairly easily get to information that is tailored to them in own a few clicks of the mouse (as long as they understand the Global Gateway flags graphic as representing many cultures). This shows a good understanding of the many cultures that may access the site, as well as the need to design with consistent principles in mind.

In small multiple design, the creators of this site might have designed for better linking structures so that the user can have more control over their experience. There are very few links on the main page, so the user doesn’t feel like they have many options. From the time that the user first enters the site, encountering the splash screen, they are led down a path toward the designers’ desired end, and not always the user’s desired conclusion. On the other hand, this makes it easy to set up the user’s default next move since there are not many options. The consistent graphics, icons, and corporate logo help to solidify the site

and make it even easier to use. The reader always knows that they are in the Chrysler site because the design is maintained on all pages.

Color is one design point that the Chrysler design team seems to understand very well. They use color in a variety of ways to create an entertaining site, but use those colors fairly consistently so that the user learns to expect certain things based on the color “code” used along with it. Colors that are used most often are as follows: black for textual explanations, yellow to draw the eye, red is used to enliven the presentation, white is a background, green to show nature and life, and blue is used with corporate logos and connotations. Finally, the site employs color well with movement, not to the point of overburdening the user, but to aid in understanding and to highlight important information. For example, the company motto is constantly switched with the rebate offer incentive, thus highlighting the motto and how the company plans to achieve its motto. The header links also change when the user mouses over them, to emphasize the fact that they do something when clicked on.

Navigation is all accomplished through textual navigation “buttons”. In fact, in general, the site does not use many graphics for links or contents sections, so the user must read each link instead of quickly scanning them. This helps to slightly lower the main page’s graphics ratio, but since the text is part of the graphic anyway, it does little good. In other cases, the text and graphics are combined well; with the perfect amount of spacing so that the user is drawn through the site without having to read every word or nuance that doesn’t interest them. Finally, many links are explained to the user (the owner’s bonus link being a good example) succinctly and clearly, and the designers have included a few interactive elements like the search and the changing graphics of the header link, to make the integration of text and graphics a success for this site.

The Chrysler site designers do a good job at making a site that follows Tufte's principles. The site scored a total of 316 out of a possible 390 points. This puts the site at a high 8 score overall. Its weakness lies more in layering and separation than any other category, although it is definitely not below average in this category compared to other sites: it just does not excel in this area. It scores higher than any Mexican site, and ranks ninth highest overall.

Dynacorn

The Dynacorn site can be reached at http://www.dynacorn.com. This site is consistently the worst site of the American sites in regards to following Tufte's principles. The design only deserved one perfect score, and that was in a good overall ratio of graphics and text. It received the lowest score for a category 11 times, where the lack of horizontal rules and the misuse of color and movement are noted examples.

The scores for Dynacorn are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	7
Consistent Theme	5
Consistent Site	6
Page Titles	7
Space Well Used	4
Avail of Navigation	2
Languages	2
Languages Separate	1
TOTAL	40

Text and Graphics	Score
Combined?	3
Graphical Nav	2
Text Flow	8
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	8
Use of Text and	7
Links Explained	6
Interactive Elements	5
TOTAL	56

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	7
Important First	7
Headings Used	4
Chunking	5
Horizontal Rules	2
TOTAL	39

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	7
Color and Movement	1
TOTAL	46

Small Multiples	Score
User Controls	4
Default New Move	4
Repeated Banner	6
Repeated Logo	4
Repeated Icons	2
Repeated Nav Devices	2
Graphic Color Theme	4
TOTAL	26

The site designers do best with the integration of text and graphics. They need to improve micro/macro design and the use of small multiples to make this a web site that users would enjoy visiting. Although, the site could stand to be improved in all areas: just about any change could be an improvement. Of course, part of the problem may lie in the fact that this is not a high profile car maker/dealer as have been looked at up to this point. However, as I saw with other smaller companies, lack of time and money

are not necessarily the defining qualities of a poorly designed site. Other small companies, like Gex or Wheatley, have effectively made due with what they had.

Of course, the site is also only available in English, indicating that the designers did not consider their international audience. The site does provide the overall site links on almost every page (the "Ask Joe Parts" page does not have any links to other pages in the site), but on the main page they are on the left side and on the rest of the pages they are at the bottom. And, since each page is usually many screens in length, it can take a bit to get to the navigation sections. As is often the case with space use problems, the designers also have problems with the principle of layering and separation. This is evident in the lack of horizontal rules in the design and in the small amount of chunking and heading use throughout the site. The designers did try to put the most important information in the key places on the screen (except for the navigation menu), which definitely makes the site a bit easier to use and to find the important information. The main page, and most second-level pages, all contain the site map and index to the site. Since this is a relatively simple site, it is probably not necessary to provide a separate page for a site map or index.

Small multiples are definitely this site's greatest weakness. They received a score of 26 out of the possible 70 points for this category. Part of this may have to do with the simplistic site structure, but a majority of it is probably simply a lack of design experience. The designers do not reuse any icons and the navigation is not consistently in the same place on every page. Even the Links page does not contain all the site's links (there's no link to the "Ask Joe Parts" section). The only "icon" in the site is the one used for the "Ask Joe Parts" link from the main page. But, this icon does not occur anywhere else, not even on the linked to page. The corporate logo does not maintain a consistent look or placement. In fact, on the second level pages, the corporate initials in the background wallpaper are the only identifying marks.

It would also help the usability of the site if the designers could figure out how to improve the user experience of navigating the site. The design could use more links and a default new move that was easy to get to. These things would greatly improve the design, as would a more consistent design. The designers could move the navigation to the top of each page, turn the navigation into some icons, include a logo on each page as part of the navigation banner, and stick with one type of page design and background to raise this site from one of the worst overall to a very decent average site. The only movement and color on the site occurs on the link page, but since this is merely provided by a dealer partner, it doesn't necessarily

count for the site. However, given the obnoxious quick animations of this graphic, it is probably just as well that the site does not have any other movement or animated graphics.

The graphics that the site does have are all fairly innocuous and plain. The ratio of graphics to text is actually quite good, at about 50% overall and 25% on the main page. However, a few more well-placed graphics would help the user and make the site more appealing in general. Although there are not a lot of words on the parts sections except to identify the graphic of each part, graphics could be better used on the "Ask Joe Parts" section to liven up the page and they could also be used on dealer links section organize the content. The designers have chosen not to include text in most of the graphics except on the main page banner. Mostly, all the graphics are just pictures of parts. This creates a kind of disconnected feel about the site and its content. The site does not seem to be tied together as well as those sites that combine words with pictures and other graphics. This is also true with the graphic links. In the textual portions of the site, links are explained adequately, as in the link to "Ask Joe Parts" on the Camaro page. The "Ask Joe Parts" section is also a good example of an effective interactive element for a site. This section allows users to ask questions and get answers from an expert from the company. The site also has email links on every page and a site hit counter.

The Dynacorn site designers could do a much better job at making a site that follows Tufte's principles. The site scored a total of 207 out of a possible 390 points. This puts the site at the lower end of an overall score of 6. It's strengths lie more in graphics and text integration, but they could still use more help in that area. They could use the most help with small multiples, however. Improvement in that principle alone would raise this site to a solid 7. This site did not receive that lowest scores for all the categories, but it was consistently one of the lowest scorers. This puts it at the very bottom of all the evaluated sites (only two sites from the Mexico group have lower total scores).

Ford

The home page of Ford Motor Company is at http://www.ford.com/us/. The site is well thought out and designed so that it is easy to navigate and find important information, regardless of culture or language. This consistency helps to make it one of the best sites of the study, as the highest-rated American site and the second highest overall.

The scores for Ford are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	10	0
Site Purpose	7	7	9	9	8	0
Consistent Theme	9	9	9	9	9	0
Consistent Site	9	9	9	9	9	0
Page Titles	8	9	9	10	10	-1
Space Well Used	10	10	8	10	10	-0.5
Avail of Navigation	10	9	9	10	10	-0.5
Languages	10	10	10	10	10	0
Languages Separate	10	10	10	10	9	1
TOTAL	83	83	83	87	85	-1

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	10	10	10	9	9	0.75
Search or Index	9	9	9	9	9	0
Simple Background	10	10	10	10	10	0
Important First	10	10	10	10	10	0
Headings Used	6	8	9	8	8	-0.25
Chunking	10	10	9	9	9	0.5
Horizontal Rules	2	2	2	2	2	0
TOTAL	57	59	59	57	57	1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	9	10	9	9	10	-0.75
Default New Move	10	10	10	10	9	1
Repeated Banner	4	5	5	4	4	0.5
Repeated Logo	8	9	10	10	10	-0.75
Repeated Icons	7	7	9	9	9	-1
Repeated Nav Devices	9	9	10	9	9	0.25
Graphic Color Theme	10	9	10	10	10	-0.25
TOTAL	57	59	63	61	61	-1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	8	8	8	0
Consistent Use	9	9	10	9	9	0.25
Color Used	6	8	6	6	6	0.5
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	7	8	8	-0.25
Color and Movement	10	7	10	10	10	-0.75
TOTAL	61	60	61	61	61	-0.25

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	10	10	10	10	10	0
Graphical Nav	9	10	10	10	10	-0.25
Text Flow	9	9	10	9	10	-0.75
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	10	10	10	10	10	0
Ratio G:T Main Page	4	4	4	4	4	0
Use of Text and	6	6	9	6	6	0.75
Links Explained	4	7	4	4	4	0.75
Interactive Elements	9	9	10	10	9	0.5
TOTAL	71	75	77	73	73	1

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	329	336	343	339	337	-0.25

The site designers do extremely well with micro/macro design, especially with space use, page titles, languages, and page length. While the other categories are strong overall, micro/macro is the best. The design would be made even better with a little more attention to color use and to link explanations. While the site is not perfect, it does seem to provide a great experience for any user.

The first page of the site takes up about one and a quarter screens. However, the last quarter mostly contains text links to what is represented graphically at the top of the page. In other words, the bottom quarter of the page does not contain any new or important information. For such a large site, it is somewhat amazing that the site maintains its theme throughout the first several layers of most of the site. This helps to unify the site and to make it easy to tell when you are still on a Ford page and when you've linked away from the site. The site purpose was not so easy to distinguish. It is actually located in the Caring for Our Customers and Community section, under Customer Satisfaction. The site states that customer satisfaction is "what this web site is all about". Once you find this, it is easy to tell that the designers have done a good job with tying the site's design to this purpose. The bulk of the site is dedicated to things that Ford customers care about: new vehicles, dealers, the company information, and the company financial health. It is even evident in the link to the Global connection gateway, which then provides links to Ford web sites in many different languages and for many different cultures. Although this is not as helpful as a direct link from every page, or at least every main page, it is still important that the site has provided users with the opportunity.

Page titling is also very helpful for users. From the “Ford Motor Company ‘98” home page, to the Ford Dealer Connection, to the Ford Financial and Money Matters, to the Ford Motor Company: Environment pages, the user can usually tell exactly where they are in the site. Pages in the site contain a lot of content, and yet they never seem crowded or confusing. The design guides the users’ eyes appropriately and helpfully. A consistent design of oval-shaped graphics is used throughout most of the web site (a notable exception being the corporate information page under the Meet Ford Motor Company area) to help in this guidance. Additionally, the page header of any page being linked to is part of all graphic links, which shows readers a glimpse of what they will be seeing. The oval graphics are reused in the pages--although not all of them all the time--to aid the reader in finding information. The use of text links at the bottom of each page that mostly correspond (no button to take the user back to the home page, although text links are available) to the graphical links above, create a sense of unity and cohesion. These graphical and textual links are always available to users and are never more than a mouse click away, so it is easy to move around the site at will simply by following links.

The Ford site has a fairly prominent link from the main page to a site map. This site map also serves as a type of index, since there is no search function available for the entire Ford site. The site map is very easy to use. Especially helpful are the reused graphics that accompany each section. However, the connection between the different sections is unclear, and this merely shows the main links--not all of the pages. Yet, at least the designers have put in the site map to try to orient readers.

Layering is done on the pages by grouping similar bits of information together into manageable chunks. Paragraphs are only found further down in the hierarchy, where the information is specific, so no generalizations are made anywhere else. Also, on the Home Page, the designers have layered the oral graphics in an oval formation that takes the eye from left to right and then right to left. Menus and lists are mostly designed in a vertical layout to the right of the page, leaving the left side for important information. Equally important in the layering is the fact that the page lengths are all aimed at staying within one screen so that the user doesn’t have to scroll. This creates effective scan zones along the right side and the bottom of the screen for easy navigation by the reader and lets them find important information. Additionally, there is a layer linking the Showroom image and the Money Matters image, marking the eye's direction of

movement, in addition to the circling motion caused by the oval shape. This design lets the reader see the important information first, and guides them easily along the natural eye paths taken for most viewers.

The design simply uses a plain white background on all pages so as not to distract from the data. Although the headings that are used are easy to distinguish from each other, the design makes little use of headings in the deeper layers, where they would be most useful. For example, the Motorsport History page uses a continue link to allow the reader to only see a little at a time. But, it may be more useful to split up the information be decade or something similar to let the reader choose where to go. This would also introduce more headings into the history pages so that it was easier to scan quickly. The designers do make scanning of the pages for links fairly easy, though. The text links are separated from the rest of the page by the use of a horizontal rule. The text links themselves are further separated from each other by a vertical character ("|") and a space. However, these lines are effectively the only ones used in the design as an aid to the separation of data. Thus, the designers do quite well with layering, but there is little separation in the design, so it seems that the design is somewhat lopsided at times.

Small multiples are found in the repeated oval shapes and the reoccurrences of the page headers within the oval buttons. However, they are not consistently placed within a certain area, so they are sometimes hard to find, and the reader can get confused and select a link that goes to an unintended location. The designers have also included the Ford logo on every page. The logo is always consistent in appearance: from the main page, to the Ford Rent-a-Car section. Additionally, the color scheme of the site matches the logo and emphasizes the company image: blue and the oval being the color and shape of the logo. The availability of the navigation options and the ordering of the links always make it easy to work through the Ford site, even if an unintended link is taken. This design for default new moves is very important in small multiple design as it also helps to put the user in control of where they can go next. The one aspect of small multiples that the designers could improve for the site is a repetition of a consistent type of page banner. Although the site's theme and the repeated logo help branding, the different page banners do not. Worse, there does not seem to be any reasoning behind a banner's design. For example, the Motorsport section banner is quite different from the Meet Ford Motor Company section. And, the Ford Rent-a-Car section header is even more different than those two. This design point ties in with the heading

issue from layering and separation design. Attempts to correct the heading issue should also have a positive effect on the page banners.

All of the graphics for the site use bright colors that stand out from the page. Not only can this be a bit overwhelming for the reader, it is sometimes confusing and makes it difficult to pick out appropriate links. However, the use of bright colors in the auto graphics is helpful, as it gives the reader a better picture of what the vehicles look like. The site uses about 10 colors on a consistent basis: blue for the corporate logo and links, white for background, black for text, red for attention, purple for visited links, gray for oval accents, brown and green and gold to help represent reality in graphics, and light blue for contrast in graphics and attention information. All together, these colors are mainly used to represent reality and to enliven the design. The site does not use the colors to label data or to aid in measurement of data. Finally, the designers use movement seldom, and only when necessary to draw the viewer's attention. For example, the main page has a moving exclamation point and scrolling text to show important messages to customers from the company.

Text and graphics are integrated within each of the images, with the text explaining what the image is. For the most part, any text within a graphic seems to be layered on top of it, floating. These same graphics are used as navigation buttons. Since they correspond to the page headers of the linked to page, it is easy to figure them out after only a few visits to the site. Words of information are separated from the graphics by white space and vertical lines, so that most information is accompanied by, at most, one or two graphics. The use of marquee text occurs only on the first page, and is situated in the lower right corner so as to draw additional attention to it, probably unnecessarily. However, the text and graphics mostly flow around each other quite nicely and uniformly because the designers use the sizing attributes to set graphics on the page, and alt text to show what would appear if images do not load. This is evident on the Motorsport Technology Transfer page. The average ratio of graphics to text is about 60%: a very good score, if a little on the high end. However, the main page is about 90% graphics, and can take a long time to load for viewers. This may turn off some to the site, and force them to go to a competitor instead, which would be a shame since the rest of the site is so useful and well designed. From the variety of interactive elements to the flow of text and graphics, the integration of text and graphics is accomplished well and in a natural way.

The Ford site designers do an excellent job at making a site that follows Tufte's principles. The site scored a total of 337 out of a possible 390 points. This puts the site at overall score of 9. Its strengths are found in micro/macro and in small multiple design. The site received the highest score among all American sites, and is tied for second highest out of all the sites, thus showing that it is indeed a well-designed site.

General Motors

The General Motors site is available at http://www.gm.com. The site has an above-average design that makes consistent use of the design principles discussed in this thesis. The site design is quite consistent in the area of small multiples and does well with providing unique sets of pages for visitors based on their selected culture. The scores for General Motors are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	7
Consistent Site	8
Page Titles	10
Space Well Used	8
Avail of Navigation	6
Languages	10
Languages Separate	9
TOTAL	75

Text and Graphics	Score
Combined?	6
Graphical Nav	7
Text Flow	7
Deliberate Placement	4
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	5
Links Explained	5
Interactive Elements	8
TOTAL	58

Layer and Separation	Score
Site Map	8
Search or Index	9
Simple Background	10
Important First	7
Headings Used	8
Chunking	9
Horizontal Rules	2
TOTAL	53

Color	Score
Avg. # of Colors	6
Consistent Use	6
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	4
TOTAL	52

Small Multiples	Score
User Controls	7
Default New Move	6
Repeated Banner	8
Repeated Logo	10
Repeated Icons	10
Repeated Nav Devices	10
Graphic Color Theme	8
TOTAL	59

The site designers received high scores in the following areas: page length, page titles, the availability of many languages, use of a simple background, repetition of logos, banners, icons, and navigation devices, how color is used, and the overall ratio of graphics to text. They need to improve in the use of horizontal rules for separation, color and movement on pages, and the deliberate placement of text and graphics on each page.

The main page of the site is about one and a quarter screens in length. Although this is a fairly good length for a main page, there are some important links in the bottom quarter that should be relocated to make the viewer's browsing experience a bit easier. Otherwise, these links to the search and site map sections could easily get passed over. It seems that the graphics on the main page are there mainly for cosmetic reasons, and so could be resized or shifted around to allow the current bottom fourth to appear in the top screenful of data, and would thus be a better use of space. This would also help with the Avail of Navigation for users, making it easier to get around the site. This navigation is quite important because it links to the site map, which provides easy access to any of the culture-specific sites for General Motors.

The purpose of this site is not immediately clear, however it gradually becomes apparent in the theme and design of each page. The site's purpose is to provide information to those users who are looking for a new vehicle. This is evident, in some sense, from the main page, where the buyer link is the first on the page, and the graphics are meant to support the advertising question of "Looking to buy a new car or truck?". The design of the site ties in to this purpose, giving users direct links to their culture-specific information from the linked to page. The theme of roads and maps is repeated in several places throughout the site. However, the metaphor is not really followed through with, thus missing some important mental connections for users. For example, a compass image could be used effectively to emphasize the personal path or site map pages, thereby showing that they have tools that can help users find their way through the site.

The General Motors site uses a simple background to emphasize the data. On most pages, it is a simple white background. However, on the "About General Motors" and "Custom Path" pages, the background has a light gray image layered between it and the text. Even though this is a bit unconventional, it does help the layering and separation design and serves to emphasize the data that occurs in this section of the site. Therefore, I determined that the site could still be said to have a simple background that

emphasizes the text (see the discussion in text contrast with background for the negative aspects of this design choice).

Other areas of the site can be found in the site map or through the search facility. The site map that is provided has an average ease-of-use and is sufficiently detailed for most users. It is a bit confusing, however, to have another search box at the top of this page when the user has clicked on the Site Map link to get here. It would be preferable to have a prominent link to the existing search page at the top instead. For the search page, it is easy for a user to enter a phrase or word. This is because it allows either form and because the designers have included some suggestions for searching directly on the page, which help the user to receive relevant search results.

The designers also do fairly well with chunking. The site is divided into three main sections that talk about the company, about their products, and a section for customization that lets the users decide how the site can be organized. Within each of the sections the users find multiple subheadings to guide them. These subheadings are easy to distinguish from each other and from the top-level headings. Subheadings beneath these, however, are the same as their parent headings, and so can be a bit confusing. However, there are few levels within the site itself, so it doesn't cause much of a problem.

The few heading levels also reflect on the organization and placement of information. Important information is not always put first or in a place that is prominent on the page, as mostly it is in the upper half and has relevant links for more information. The design could be aided by the use of horizontal or vertical rules to help separate the data. As it is, horizontal rules are used very little: mainly just in the page banners. The General Motors site does make good use of small multiples in their repeated icons, navigation devices, and logo across all pages. The page banners are also repeated, however not always on every page. The color scheme is also mostly consistent throughout the site, but could be followed through better in the personalization section and site map.

The designers seem to have given little thought as to how the user navigates the site. There are few paths to take, although there are always multiple links on each page, and the navigation is always fairly easy to access. For example, it is not possible to go from one main section to another without going back to the main page. This also reduces the effect of the default new move principle as the user must often use the mouse to get to the navigation or other information.

The site makes use of about 15 colors on the average, which is a little high. Additionally, these colors are not used in a consistent manner, though the colors are used to label the banner, to show reality in graphics of people and vehicles, to enliven the design with map imagery, and to measure images of maps and the depth of the site for the site map. The colors often used are: blue, light blue, green, purple, black, white, gray, red, yellow, turquoise, sepia, tan, green, dark gray, and blue-green. The site has an average contrast for the background with the text since they use some background pictures on top of the white background. This sometimes can distract from the data, as it slightly obscures the words that appear over the image, especially since the text is black and the images are light gray. The site could use of help with color and movement as well. The only moving parts are the stock quote and announcement areas on the main page.

Finally, the site does an average job with integration of text and graphics. The average ratio of graphics to text is about 30 percent. While this aids page loading times and receives a high score for that, it is on the low end of the spectrum. The main page has about an 80 percent ratio of graphics to text, which greatly increases load time, and makes it quite hard to anticipate what will appear on the page since the text is mainly on the bottom quarter of the page. The designers have added a few interactive elements, though, to improve the user experience. These interactive elements are the custom path, feedback section, dynamic stock quote, and dynamic headlines sections. The navigation buttons that are used allow with these interactive elements also include text descriptions, so they are not strictly “navigation icons”, though they are easy to figure out because of it. Text and graphics are always combed in the page banners, as well. The flow of the text with the graphics is also average. There are some places where the flow is done well, but it is usually either too close to far away, as in Company Affairs page.

The General Motors site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 297 out of a possible 390 points. This puts the site at overall score of a solid 8. The designers can be proud of their reuse of graphics as small multiples and the varied uses of color that they have found. But, they would be wise to take a closer look at using rules to separate data, and at incorporating better interactive elements in the site.

Gex

The Gex site is available at http://www.gex.com. The site seems to have a slightly above-average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site does quite well with including a site purpose and at the default new move principle. These things help to make it one of the better sites, although definitely not one of the top 10 sites in the group.

The scores for Gex are as follow:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	10
Consistent Theme	8
Consistent Site	8
Page Titles	8
Space Well Used	7
Avail of Navigation	6
Languages	2
Languages Separate	1
TOTAL	56

Text and Graphics	Score
Combined?	6
Graphical Nav	5
Text Flow	10
Deliberate Placement	8
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	9
Links Explained	5
Interactive Elements	4
TOTAL	67

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	5
Important First	6
Headings Used	7
Chunking	6
Horizontal Rules	9
TOTAL	51

Color	Score
Avg. # of Colors	6
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	4
Color and Movement	7
TOTAL	51

Small Multiples	Score
User Controls	6
Default New Move	10
Repeated Banner	9
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	8
Graphic Color Theme	6
TOTAL	58

The site purpose and the default new move principles are the strengths of this site. In fact, this site is the only one among the American sites to receive a perfect score in these two categories. The designers also did well with creation of a useful and detailed index, the use of horizontal rules, and the ratio of text

and graphics throughout the site. They do need to improve in their background choice, as well as making the site more accessible for other cultures.

Although the site claims to be the "World Wide Connection" for Volkswagens, the designers do not offer pages that are either translated or adapted for readers of other cultures. As a result, the site fails in several key areas that keep it from being a top-10 site. The first area that could be improved overall is page length. The main page is over two and one half screens in length. This hides much of the important information behind two or more mouse clicks. This leads to a slight fault in the availability of the navigation. The main page navigation starts at the bottom quarter of the first screen and continues for another full screen. Then, on subsequent pages, the navigation is just found at the top of each page (although, at least the designer includes a link at the bottom of each page that points to the top of the page), and so the user must first scroll down a lot to get to all the content, then scroll back up to get to the links.

The site could stand to be broken up a bit more into a deeper hierarchy so that the main content would not take up so much of each page. This would also improve the space use so that each page did not seem so crowded. This type of improvement would also affect the design theme in a positive manner. The one highlight of the site's micro/macro design is the explicit statement of the site's purpose. It is obvious on the main page that the site is dedicated providing the "best in products and services" for users, and on the Company Introduction page where the designer explicitly lays out the ingredients to a "successful business" and then explains how Gex uses all those ingredients.

As a whole, the site design is mostly above average, but not exceptional, with layering and separation. The main change to this design should be the background. In many cases, the design uses black text on a dark blue background. This is even worse for link text since the visited link color has been changed to dark blue (thus, users can't see the links to return to a page they wanted). Otherwise, as stated earlier, the designer should work on deepening the hierarchy so that the site employs better chunking techniques. This would also bring the important information into more prominent positions on the pages. The one truly exceptional aspect of separation in the design is the use of horizontal rules. From the site map and each underlined word link to the use of boxes to separate commentary from part links, the rules help to better define where the user can find the information that they seek.

Although I do not personally like the way that the design handles the default new move because there is really no way to tell what is before or after, it is definitely easy to move through the entire site by just clicking the one Next button. However, the design could also use some more navigation links to help the user move around more, and give the user more control over how they interact with the site. It is also nice to see the fairly consistent repetition of a banner, navigation devices, logo, and icons (mainly found in the numbering scheme for each page).

Color use in a design is definitely the designer's weakest point. Although the design uses color to label parts, to show reality through pictures of parts, and to enliven the design with a gradient-colored background, the many colors are used somewhat haphazardly. There are lots of shades of blue, as well as black, white, red, gray, green, and yellow: None of which can be said to correspond to any one thing. Additionally, the main page has lots of movement, which detracts from the content: there are a spinning globe, an animated car, and a scrolling announcement banner. On the plus side, these movements use only a few colors (red, black, blue, and gray), and not more than two per animation.

Other graphic use is done well. The overall site has about a 50:50 ratio of text and graphics so that the pages load quickly, and the main page has only a 60:40 ratio of graphics to text. The designer has also made it so that the text flows nicely around the graphics, so that they seem more connected to each other. This is accomplished through the use of the boxes to separate the main text from the parts graphics, but it is also found in the links and part descriptions that accompany the part graphics. To improve the site's integration of text and graphics, more focus should be given to the interactive elements of the site map, the feedback form, and the navigation design so that they are more intuitive. The design could also use a few more interactive elements like dynamic menus, a search facility, or dealer locator.

The Gex site designer does an average job at making a site that follows Tufte's principles. The site scored a total of 283 out of a possible 390 points. This puts the site at an overall score of a low 8. It gets the 8 because of its strong graphics and above average layering and separation design points. It also falls very close to the median score for all American sites, 280. This shows that it is indeed quite average. Interestingly, it also falls at the median (281.5) and the average (280.27) scores for America and Korea together (Mexican sites have a lower average score that brings down the combined numbers to 270.68 average and 267.5 median).

Harley

The Harley Davidson site is available at http://www.harley-davidson.com. The site has a good design that makes consistent use of the design principles discussed in this thesis.

The scores for Harley Davidson are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	8
Consistent Theme	8
Consistent Site	9
Page Titles	10
Space Well Used	5
Avail of Navigation	4
Languages	2
Languages Separate	1
TOTAL	57

Text and Graphics	Score
Combined?	9
Graphical Nav	10
Text Flow	8
Deliberate Placement	9
Ratio Graphics: Text	6
Ratio G:T Main Page	10
Use of Text and	4
Links Explained	8
Interactive Elements	5
TOTAL	69

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	9
Important First	9
Headings Used	5
Chunking	9
Horizontal Rules	7
TOTAL	57

Color	Score
Avg. # of Colors	8
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	4
TOTAL	54

Small Multiples	Score
User Controls	7
Default New Move	8
Repeated Banner	10
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	63

Page length of the main page, page titles that show structure and aid recognition, and repeated small multiples are the categories where this site did especially well. They need to improve the navigation availability, cultural pages (as they have none except American), and the overall use of text and graphics.

The main page takes up less than a screen of length, but is mainly functioning as a splash screen. The main page to the default site is actually two and one half screens long, but I have given the designers the benefit of the doubt on this aspect of the design since the “splash page” can actually take the user to two

different sites (although it is unclear why they would have two different sites just for an anniversary--usually designers just forward users to the new site, then send them back once the promotion has ended). And, although there are two distinct sites, neither is designed for an international audience: they are both for American viewers. This analysis, though, will focus on the default site since it is expected to last longer and be more complete.

The site's purpose is stated in the company mission page, must it takes a bit of guessing to get there, since there are lots of other links where it could be, like on the main Company page or the Experience page. However, once you find it, it is immediately obvious that the designers have created the site around this purpose, using a consistent theme of (what else?) leather, or black colors. The page titles make it easy to determine how a specific page fits in the site structure. For example, the History page has the following title: Harley-Davidson: Company – Background and History". While page titles are a positive aspect of the site's micro/macro design, the Avail of Navigation options is much less positive. This is especially true for the higher levels of the site, where the user is forced to do a lot of scrolling to find all the available links. On the main page, the top graphic links to each main section, but the links to those sections and their subsections doesn't appear until the start of the third screenful of data. In other pages, the banners and headings are so large that navigation is relegated to the bottom of those pages as well.

For layering and separation, the design received scores of 9 in all but two categories: headings and horizontal rules. The headings received a score of five because they are all the same: there is no easy way to distinguish levels from the top "Company" level to the "Frequently Asked Questions" lower level. The design could be improved if more rules were used to aid separation. Currently, they are only used in headings, but they could be valuable in separating navigation devices from content and in underlines for section links.

While the design makes extensive use of repeated small multiples, as in the Company Logo and the "Go" buttons, the design lacks sufficient user controlled navigation and an understanding of the next logical link. Although these aspects are by no means horribly done, they can be improved to allow the user freer access to the site and its content. Moving the main navigation to the top of each page would help this, as would more internal page links to children pages in the same section. However, it should be

acknowledged here that this site received the second highest score in the layering and separation principle among all American sites, and is tied for third highest overall.

The principle of color is probably the one that could stand the most improvement out of all five. The site uses a few too many colors, and has some problems maintaining those colors' meanings throughout the site. The design uses black extensively, as well as red, gold, white, blue, purple, gray, sepia, brown, and yellow. While the black background provides average contrast with data, the use of blue text links with it could be improved. Also, the places where white text has been used in a graphic with a black background causes the text to appear slightly blurry, as is the case with the text on the default site home page. An even more important design point for color is how the design makes use of color and movement. Currently, the site uses little color along with movement. The only example of this in the site is the changing of menu item links as they are selected.

Of course, this carries over to the design's integration of text and graphics. The design needs to make better use of the graphics that it has. The present uses are mainly to enliven the presentation, and they serve so functional data-gathering purpose. Even the large size of the page banners, although the banners do help users with understanding location, make it hard to find data because they are so large. The text within some of the graphics needs to be brought out and placed directly on the page. Not only will this speed up page downloads, but it will help cure some of the text fuzziness that was discussed earlier. This is especially true of the second level pages, where the section introduction is explained as text in a graphic. The designers do a good job with sizing and defining an alt attribute for most of the graphics, however. This is obvious in the company's Financial Info page.

The Harley-Davidson site designers do a fairly good at making a site that is usable by a broad American audience since they seem to incorporate many of the desired principles at a high level. The site scored a total of 300 out of a possible 390 points, putting it at an overall score of a high 8.

Isuzu

The Isuzu site is available at http://www.isuzu.com. Although this site does not really have any specific area where it outshines other sites, it does consistently earn high scores in all aspects of design, which help to make the site one that is above average.

The scores for Isuzu are as follow:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	6
Consistent Theme	9
Consistent Site	7
Page Titles	10
Space Well Used	7
Avail of Navigation	10
Languages	2
Languages Separate	1
TOTAL	61

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	10
Deliberate Placement	8
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	7
Links Explained	7
Interactive Elements	5
TOTAL	69

Layer and Separation	Score
Site Map	1
Search or Index	6
Simple Background	10
Important First	8
Headings Used	7
Chunking	9
Horizontal Rules	8
TOTAL	49

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	60

Small Multiples	Score
User Controls	6
Default New Move	5
Repeated Banner	9
Repeated Logo	9
Repeated Icons	7
Repeated Nav Devices	9
Graphic Color Theme	6
TOTAL	51

The site designers keep the main navigation accessible, create titles that are useful, implement a simple background, keep the flow of text and graphics consistent, and especially use color effectively to help readers. They need to improve the site by adding in culture-specific areas and by providing a well-defined site map.

The designers have started off with a splash screen, but since it automatically loads the real main page, I have calculated that page's length for the score. The main page is a bit long at one and a half pages, but the content on the hidden half page is not very important, and most people can navigate the site without ever having to scroll this page. The site uses the corporate theme of "Go farther" as the purpose of the site. This produces some nice tie-ins, but it doesn't always follow through. In the first case, this motto is a bit hard to quantify and exemplify. The main area that this isn't applied is in the Owner's section. All other

sections show pictures of how people or their employees go farther with an Isuzu. On the plus side, each page has a unique title that helps to identify it by giving the company name, the section name, and then the subsection name.

The site could definitely use a site map to help aid in navigation, even though the main navigation links are easily available from every page. A site map would let users get from the main page to the site map page to a specific low-level page without having to do a lot of clicking back and forth to find the correct area where the page is located. Some users might wonder if “Our Vehicles” or “Our Owners” are for those who already own an Isuzu vehicle. The navigation itself serves as a sort of index to the site, but it would be quite helpful to have a search feature, or at least a listing of all the pages in the site.

Although the navigation is always readily accessible, it is not always clear what the default next move should be. Part of this confusion comes from the links on the main page (the first graphic links to a subsection under “Our Owners”) that make it seem like the site has five main sections instead of four. Additionally, the navigation on the section pages is not presented in the same organization as on the main page, so it takes a little bit of thinking for the readers to reorient themselves for each section. The site could do much better with small multiple design in general, as well. Although there aren’t any scores below five in any category, there are not any tens either. This would be easy to do with the company logo and repeated banners and other icons. But the site design is not always consistent in these areas. For instance, the Isuzu logo is red on the main page (and on some others), but it is white on black for most other pages. One area where the design does not need to change is in how colors are used in the site. The design makes effective use of color to label, measure, show reality, and enliven. Perhaps the hardest of these to achieve in a site like this is the “measure” quality. But the Isuzu design brings this out nicely in the “Go farther” signs in many of the graphics. These signs are basically a white or light toned color and contrast nicely against the backgrounds, helping users to “measure” the distance of how much farther owners can go with Isuzu. This, then, reinforces the purpose and the corporate message.

The text flow with the graphics is very nice throughout the site. Text is closely aligned with graphics to tie together important chunks like the customer testimonial that appears on the “Our Owners” page. This helps users to quickly find and digest the content and then go back to the information at hand. In other areas, the text is slightly separated from graphics to emphasize divisions and page banners. I would

like to see more interactive elements in the site to make it more attractive for users. As it is, the existing elements on email links and being able to add a comment are nice, but could be built upon to strengthen the community. One big way to improve the interactivity is to give back most of the site navigation to users with a site map or search function, or even through making more links available from each page.

The Isuzu site designers have created a site that is generally usable by a broad audience because they do so well with each category. The site scored a total of 290 out of a possible 390 points. This puts the site at overall score of 8. It is a low 8, but still quite solid due to the consistency of the site in applying these principles. It's strengths lie more in color and micro/macro design.

Jeep

The Jeep site is available at http://www.jeepunpaved.com. This site scored slightly behind Ford and above Chrysler among the American sites. The designers have done extremely well across a broad range of categories, helping the site to score above average in all five principles.

The scores for Jeep are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	9
Consistent Site	10
Page Titles	5
Space Well Used	8
Avail of Navigation	10
Languages	10
Languages Separate	10
TOTAL	79

Text and Graphics	Score
Combined?	9
Graphical Nav	8
Text Flow	9
Deliberate Placement	8
Ratio Graphics: Text	4
Ratio G:T Main Page	4
Use of Text and	7
Links Explained	8
Interactive Elements	8
TOTAL	65

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	7
Important First	9
Headings Used	8
Chunking	10
Horizontal Rules	8
TOTAL	60

Small Multiples	Score
User Controls	10
Default New Move	8
Repeated Banner	9
Repeated Logo	10
Repeated Icons	10
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	66

Color	Score
Avg. # of Colors	8
Consistent Use	10
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	7
Color and Movement	10
TOTAL	63

The site designers are most effective with micro/macro design. This can be attributed to the many separate language pages available for the site (including English, Spanish, Korean, Chinese, and Japanese), but the designers have also done well with navigation that is always available because it resides in a separate browser frame and with page length, keeping the site design consistent with the purpose and metaphor of an unpaved road. In the other principles, the designers also define appropriate information chunks, use repeating logos and icons to help the reader identify the site, and give control of the site to the user through plenty of navigation choices and in-text linking. The site also sports some great examples of color use, especially in regard to use of color with movement. Examples include the introductory splash screen and the rotating ad banner at the top of the page, which uses muted colors to help to blend it in with the rest of the site. However, the design is not perfect. They need to improve the page titling so it is easier to bookmark and get a quick idea of where the user is in the site. Although this might be overlooked because of the use of frames, the designers consistently jump out of a frameset and create a new frameset of pages that has a different title. The other main area that should be focused on is the extreme ratio of text to graphics on each and every page. This helps to make the site a bit livelier perhaps, but it slows access time way down and puts page load times up since the inter-page links are almost never text, and so they load slowly along with the rest of the graphics.

The site scored 79 points for micro/macro design, out of a possible 90. Although Ford was higher with 85, no other sites in the Korean or Mexican sites scored higher than these two for this principle (the Piso site from Mexico, however, did score 79 as well). It would have scored even higher if they had stated the purpose of the site explicitly, instead of letting it just be implied in the design and content of the site. They could also tighten up the space use a little so that there isn't as much dead space between areas (there is more than enough even with the desire to chunk and layer the presentation). However, these are minor, and do not really distract from the overall micro/macro design.

The site background is the worst part about the layering and separation design. Looking at the overall score for this category, this “low” score shows that the site does a great job with this principle because the main fault with the background is that it is actual background representing dirt and mountains that is incorporated in the page design graphic. Although it is possible to see the “true” white background on the edges of the presentation, this is more for spacing and placement of the actual page within the browser frame. The fault of the site map and index is that they are more based on a corporate organization that a true representation of the site. The site uses only a few levels of headings, but these are easy to distinguish between. However, this also affects the score for horizontal rules slightly since there are not a lot of headings in the site. But again, these are relatively minor inconveniences compared with other design mistakes. Jeep has the highest combined score for this principle (60 out of 70) among all American sites. It ties with one Mexican site, and is fourth behind all Korean sites for this principle.

The default new move category for small multiples is probably the really only “problem” spot for the site with this principle. And, in fact, this site scored 66 out of 70 here, the highest total for this principle out of all the sites (the Mexican site for Vitro came close with 65 though). The “fault” of the default new move design is that it is sometimes confusing where to click to get the next move. Perhaps the design errs a bit on the side of allowing excellent user control, and so misses the opportunity to help guide the reader a bit if needed. In any case, this could be alleviated by making the links stand out a bit more, and keeping them in the same general location.

Jeep ties with Chrysler in the score for the color principle (with a score of 63), and falls just barely behind Hyundai and SsangYong out of all other sites. Color use in the Jeep site is extremely well done in keeping with the theme of unpaved roads and byways, using lots of browns and tans. They use about 10 colors consistently, including several shades of brown for dirt and mountains, white for text on graphics, black for outlines and other text, and red and blue for images. Of course, since these colors are used quite a bit for graphics as well as background, the text contrast with this background is not as sharp as it could be with more opposing colors like black on white.

This brings us to the next principle of integrating text and graphics. This design uses lots of graphics, and most of the text is used in the graphics themselves, so the integration and flow are all fairly good. They could improve, however, the use of sizing attributes and alt text to help those readers who are

waiting for the page to load. And, as mentioned before, the 85% ratio of graphics overall and the 95% of graphics on the main page, are somewhat overwhelming, lowering the score for this principle significantly (a total of about 15). If the design used more regular text instead of a "brochure" look with tons of graphics, the site could easily become the highest rated out of all other sites.

The Jeep site designers do an excellent job at making a site that follows Tufte's principles. The site scored a total of 333 out of a possible 390 points. This puts the site at an overall score of a very solid 9. Its strengths definitely lie micro/macro design, layering and separation, and small multiples, which all help to raise this site to its current ranking. Overall, the site is fourth, behind Hyundai, SsangYong, and Ford.

Lexus

The Lexus site is available at http://www.lexus.com. The site does best with color and integration of text and graphics, although its scores in these areas are not the highest of most consistent among all the sites. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better sites, although definitely not one of the top 10 sites in the group.

The scores for Lexus are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	9
Consistent Site	9
Page Titles	6
Space Well Used	8
Avail of Navigation	10
Languages	2
Languages Separate	1
TOTAL	62

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	10
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	8
Links Explained	8
Interactive Elements	7
TOTAL	68

Layer and Separation	Score
Site Map	9
Search or Index	6
Simple Background	9
Important First	10
Headings Used	5
Chunking	9
Horizontal Rules	2
TOTAL	50

Small Multiples	Score
User Controls	10
Default New Move	8
Repeated Banner	7
Repeated Logo	3
Repeated Icons	10
Repeated Nav Devices	10
Graphic Color Theme	8
TOTAL	56

Color	Score
Avg. # of Colors	10
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	7
TOTAL	59

The site designers seem to have a good understanding of Tufte's design principles, including the screen size of the main page, keeping the navigation available for users and letting the user control their browsing experience (as evidenced in the structured hierarchy and easy-to-use site map), putting important information in the right places to be seen easily, and the nice flowing of text with graphics in the design. They need to improve the site by having more than just an English version of the site, using more rules to separate and highlight data, repeating the logo to help branding and site recognition, and lowering the percent of graphics on the main page.

Besides the cultural sites that need to be added, the designers could greatly improve in micro/macro design by explicitly stating the site purpose and by creating better page titles. As it is, the titles seem a bit haphazard in their specificity and uniqueness. For example, the site map is titled Lexus Site Map, while the owner area is just titles "Owner Services".

The site map could also be slightly improved by making it fit in one screenful of information. However, the site map is quite useful and fairly detailed currently. The site could also use a search feature to aid users in navigating through the sometimes-daunting hierarchy of pages. In lieu of this, the design does offer a drop-down navigation aid that functions in many ways like an index of main topics in the site. However, the user has to scroll through these since they are part of a rather long list. The only other category in layering and separation design that needs work is for headings. The site does a great job with chunking information into meaningful units, but the headings appear similar for all levels of data. Therefore, it is hard to see at a glance how the content fits into the hierarchy or site.

The designers of this site understand the importance of small multiple repetition of icons and navigation for site use, so they are repeated consistently on every page. This is very evident from the site map, where the icons next to each section also appear, in a slightly larger form, on the actual section page. However, the designers did not take the opportunity to repeat the corporate logo on every page. And, when

it is repeated, it looks different every time. For example, the logo appears in the upper right corner of the main page, not at all on the Tech Services page, and only in the graphic (looking different in color, prominence, and placement) on the Owner Services page.

Color use is a stronger point for this site's design. The site uses 8 colors consistently: white for text or background, blue for background, dark blue for text, teal for emphasis, gray for the logo, black for text of outlining, gold for icons, and green for backgrounds. Although the colors are not consistent always for what they are used for, they are only used for one or two things, and not for many. The site often uses earth tones for backgrounds, but the text is usually white, so the contrast is not very sharp. Also, the site makes use of lots of movement. Some of it is entertaining (like the "ad" on the main page), but the zooming car on the Tech Center page goes by too quickly and is merely distracting.

The average ratio of graphics to text throughout the site is a nice ratio of about 35%. These pages load quickly and get right to the content. The main page, though, has about 85% graphics on it, which is a bit high for a main page. A 60% ratio would be much better. Using more real text instead of graphic-drawn text in the bottom portion of the page can do this. Even if the MouseOver function is not possible with plain text, the explanation for how to do it can be. Finally, graphics are not deliberately placed on the page, resulting in shifting text and images as other graphics load, and no alt text for broken graphic links or for those who turn off the display of graphics.

The Lexus site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 295 out of a possible 390 points, which puts it squarely in the overall score of 8. Although this site is above average for the other American sites, and even all sites in general, it could use more work in the small multiples and micro/macro design to help it get closer to a score of 9.

Mack

The Mack site is available at http://www.macktrucks.com. From first sight, it is obvious that this site has not been designed with an audience in mind or with an understanding of hypertext principles, but just put together based on some ideas for what is needed and what the designer can do. The site has a slightly below-average design that makes little use of the design principles discussed in this thesis. However, the site is by no means horrible, and does manage to do well in a few areas.

The scores for Mack are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	9	9	10	10	10	-0.5
Site Purpose	2	1	2	1	1	0.5
Consistent Theme	7	7	8	7	7	0.25
Consistent Site	7	7	9	7	7	0.5
Page Titles	6	5	5	5	5	0.25
Space Well Used	8	9	7	7	7	0.75
Avail of Navigation	7	9	8	8	9	-1
Languages	2	2	2	2	2	0
Languages Separate	1	2	1	1	1	0.25
TOTAL	49	51	52	48	49	1

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	4	4	4	4	4	0
Search or Index	4	4	4	4	4	0
Simple Background	3	3	7	3	5	-1
Important First	7	7	8	8	8	-0.5
Headings Used	6	8	8	6	6	1
Chunking	8	8	8	9	9	-0.75
Horizontal Rules	4	4	5	4	4	0.25
TOTAL	36	38	44	38	40	-1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	5	8	5	6	6	0
Default New Move	7	6	7	7	6	0.75
Repeated Banner	3	3	3	3	3	0
Repeated Logo	3	5	4	4	4	0
Repeated Icons	2	1	2	2	2	-0.25
Repeated Nav Devices	5	5	8	6	6	0
Graphic Color Theme	6	6	6	5	6	-0.25
TOTAL	31	34	35	33	33	0.25

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	10	10	10	10	10	0
Consistent Use	8	8	8	8	8	0
Color Used	6	6	8	6	6	0.5
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	6	6	6	5	5	0.75
Color and Movement	4	3	4	4	4	-0.25
TOTAL	54	53	56	53	53	1

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	7	7	7	7	7	0
Graphical Nav	6	6	5	5	5	0.5
Text Flow	8	8	9	9	8	0.5
Deliberate Placement	5	5	5	5	5	0
Ratio Graphics: Text	10	10	8	10	10	-0.5
Ratio G:T Main Page	10	8	10	10	10	-0.5
Use of Text and	7	6	7	6	6	0.5
Links Explained	5	5	5	5	5	0
Interactive Elements	3	1	3	3	3	-0.5
TOTAL	61	56	59	60	59	0

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	231	232	246	232	234	1.25

The site designers keep the main page rather short, which is not very common for sites that have not been well designed. So, that is a definite plus. Along with this, the design is chunked in a fairly meaningful and consistent manner, as it has been broken up into well-defined areas like corporate information, merchandise, and product lines. The site also does well with keeping the number of colors used to a minimum, at eight. Most impressive of all is the very nice ratio of graphics on the main page and throughout the site. Not many other sites scored a ten in both categories. They need to improve the site by explicitly defining a site purpose, make the site available for multiple cultures and languages, create a useful and detailed site map and index or search, use repeated graphics and icons for faster loading and site branding, and do better with interactive features like guest books, email links, and even color and movement to attract the eye of the reader.

The micro/macro design of this site is hampered by the lack of cultural versions of the site and by a lack of purpose defined for the site. It cannot even be said that the purpose is implicit in the site because the site tries to do so much, from merchandising to giving information. There does not seem to be a single focus that would help identify what the site is for, not even in the corporate section of the site. The page titles are also not very helpful for users as they don't identify levels or the site (the corporate section, as well as several other pages, are titled "Corporate Information Frame"), and they seem to contain some site metadata that is superfluous for users, like the term "Frame".

The background for the main frame of most of the pages is simple and white. However, the navigation frames use either color or a metallic graphic, which is distracting. Even worse, the metallic

pattern graphic is used for the background for the entire main page. Although this is an attempt to create a theme for the site, it is too disruptive to the foreground. It would be better to use the graphic in icons or in heading text instead. Also, the site could use more horizontal rules, apart from the ones provided by frame borders, to help layer and separate the information.

Small multiples design is probably the greatest problem area for the site. The score of 33 out of 70 is not the lowest, but it comes close. Although the site does an adequate job at allowing the user control of where they go in the site, there are not many paths or links to help this goal. It would also help greatly to have the logo repeat and look the same to help the site's branding. Although it usually appears in the upper left corner of the pages, it is an animated graphic that changes to a Home link. In the main frame, a logo also usually appears, but it does not look the same on the main page or the Product Information page.

The site design makes good consistent use of colors and keeps the number of colors to about eight, which is quite pleasing for the eye. The designers could do better with how the colors are used, by using them to label and measure as well as to show reality and enliven the presentation. For example, color could be use in the product information section to identify and label each kind of truck (CH, CL, and so forth). It could also be used in the News section to help measure the time between news postings.

As mentioned before, the site does very well with creating a nice ratio of graphics to text. The designers also do a pretty good job at combining text with the graphics where appropriate, like in the page banner for the News section. It does get a little much in some places, where it would be easy to just use text outside the graphic, like on the Product Line page. Additionally, the design could use some better navigation icons that are more polished and easier to figure out. For example, the icon for New Products is the same as for Corporate Information.

The Mack site designers do a fair job at making a site that is usable and useful. The site scored a total of 234 out of a possible 390 points. This puts the site at overall score of 6. It could get a 7 by improving the small multiple designs slightly. Mainly, this could be done by using a standard logo in a standard location, and by using repeating icons or navigation devices. But, the site could also greatly benefit from a site map or a search function. It's strengths lie more in the integration of text and graphics, than in anything else, and this strength should be exploited even more with better graphics and more deliberate placement with size attributes and alt text.

Mann+Hummel

The Mann+Hummel site is available at http://www.mann-hummelauto.com. The site has a fairly useable design that scores in the middle of the range of scores for most categories. However, the site does have some strengths in micro/macro design and color and graphic use. Those benefits help to raise it up from a mediocre site to an average one.

The scores for Mann+Hummel are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	3
Consistent Theme	9
Consistent Site	6
Page Titles	4
Space Well Used	5
Avail of Navigation	2
Languages	2
Languages Separate	1
TOTAL	38

Text and Graphics	Score
Combined?	9
Graphical Nav	6
Text Flow	7
Deliberate Placement	5
Ratio Graphics: Text	8
Ratio G:T Main Page	10
Use of Text and	4
Links Explained	6
Interactive Elements	6
TOTAL	61

Layer and Separation	Score
Site Map	8
Search or Index	8
Simple Background	10
Important First	7
Headings Used	4
Chunking	4
Horizontal Rules	5
TOTAL	46

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	5
TOTAL	55

Small Multiples	Score
User Controls	6
Default New Move	7
Repeated Banner	8
Repeated Logo	10
Repeated Icons	2
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	50

The site designers do especially well with keeping the background a simple, plain white. The company logo is also repeated on every page, and though it is not in the same place as on the main page, it looks exactly the same, and so does not cause any disruption in interpretation. The ratio of text to graphics on the main page is about 60%, which is a little high, but still within the acceptable range. They need to improve in many areas, but especially in declaring the site purpose, making the navigation more available

than just at the bottom of each page, providing language versions of the site, repeating the navigation icons instead of just using text navigation on pages other than the main one, and integrating text and graphics for effective data display.

Micro/macro design principles are an area that this site's design can gain the most improvement in. The first page takes up about two and a quarter screens, the site's purpose isn't laid out anywhere (nor can it even be implied from the design), the page titles are all the same so that there is no distinguishing between the pages out of context, and the navigation is only available at the bottom of the secondary pages, in text format. One good aspect of the design is that the theme of the site is mainly consistent across all the main layers of the site.

Since the site is not very deep, the main navigation links provide an effective site map. However, since the user does not necessarily know this, they may look for the feature in vain. Although the main page is long, the more important information, including the main links, is included in the top screen of information. The site could make even better use of this space by making the main page graphic smaller, or locating it to another page. On the other pages, the mainly textual aspect of the pages ensures that this important information starts at the top of the page, with the corporate logo firmly located in the upper left corner. However, it would be better to move the navigation to the very top of the page (or at least copy to the top) for easier access.

The design does an average job with using rules, headings, and chunking. The rules are a bit too think and intrusive on the secondary pages. Additionally, a horizontal rule appears near the bottom of the Information Exchange page, which is inconsistent with the rest of the design on the other pages in the site. The site has relatively few information chunks, and these are usually separated and easily identifiable. But, the site design could incorporate more levels into the headings and chunks so that the information would be easier to scan.

For small multiple design, the site makes god use of a repeated logo, as well as repeating the "banner" look on the secondary pages. Although this "banner" is merely the content heading, each page uses this same look as its heading. And, although the navigation icons are not repeated in the design, the navigation text links appear at the bottom of every page.

The design has quite a few colors for such a small site, and these colors are mainly consistent in how they are used. Green is used for the corporate logo, but also for the vertical rules. Black is used for text and for marking corporate offices on the main page map. The site does not, however, take advantage of color and movement to draw the reader's attention or to emphasize data. The only movement comes from the color changes of links as they are clicked.

In general, text and graphics are not integrated in the site design. A strong vertical rule separates text from the graphics on secondary pages, and text is only found in graphics for the logo and for the navigation icons on the main page. Thus, there is not much need to flow text with graphics. One example of less than ideal flow occurs on the Overview page where the textual description wraps underneath the vertical rule instead of staying inline with the rest of the text, as it does with the Information Exchange page text. Finally, since the secondary pages are mainly textual, the overall ratio is quite low. The designers tried to overcome this by including extraneous graphics along the left of the screen, but they aren't tied in with the content. Reusing the navigation icons would help this, as would incorporating more graphics inline with the text to emphasize points.

The Mann+Hummel site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 250 out of a possible 390 points. This puts the site just above the minimum score for a 7. It gets the 7 because of its average consistency and its fairly strong color use scores.

Mercury

The Mercury site is available at http://www.mercuryvehicles.com. The site has a strong design that makes above-average use of the design principles discussed in this thesis. That consistency helps to make it one of the better sites in the American group, and above average in the other groups. The scores:

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	7
Headings Used	7
Chunking	10
Horizontal Rules	9
TOTAL	55

Small Multiples	Score
User Controls	9
Default New Move	6
Repeated Banner	7
Repeated Logo	9
Repeated Icons	6
Repeated Nav Devices	8
Graphic Color Theme	9
TOTAL	54

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	10
Consistent Site	9
Page Titles	4
Space Well Used	8
Avail of Navigation	6
Languages	10
Languages Separate	9
TOTAL	72

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	10
Deliberate Placement	8
Ratio Graphics: Text	6
Ratio G:T Main Page	6
Use of Text and	8
Links Explained	7
Interactive Elements	8
TOTAL	68

Color	Score
Avg. # of Colors	8
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	6
TOTAL	57

The site designers' forte seems to be micro/macro design and integration of text and graphics design. The site has a consistent theme with the handwriting text and the images revolving around the company logo. Since the company is part of the Ford group, they also have access to Ford's world connection page with links to many other sites specific to a culture. Chucking of information into identifiable groups (in this case, by specific vehicle) is also done well, as is the flow of text and graphics on the page, exemplified by the Showroom page section. They need to improve in small multiples, layering and separation, and color, in general. But, the only real problems are in page titles and in the ratios of text and graphics.

The page titles are all "Imagine yourself in a Mercury." While this may be an effective slogan, it does not belong in the title of the page, let alone the only thing in the title on every page, especially since these words also appear on one place or another within the content of every page. Equally frustrating is that the navigation is relegated to the bottom of each page, usually a scroll out of site, since the pages are all so graphics-heavy. Additionally, the site would benefit from a search feature for the entire site instead of just dealers. It would also be nice to have the links on the main page that effectively constitute the site's map, to be located in closer proximity to each other.

The design of the site's small multiples is fairly good. The site uses lots of repetition in the logo and in page banners and icons. However, the repeated items are not usually identical or located in similar places on the page, or in relation to each other. For example, the What's New and Incentives pages (available from the Showroom section) do not look like the other pages since the corporate logo appears larger on these pages, and the breadcrumbs navigation trail that is highlighted on the other pages does not show up on these pages. This also tends to complicate the default new move design that worked well on other pages. Another complication comes in how the site uses color. While the site does well with using color to show reality in the vehicles, and to enliven with the Imagine TV section, they do not use it to label or measure. This would be effectively used by keeping each kind of vehicle a certain color (for example, all small passenger vehicles red and all trucks blue), and using color-coded headings to better distinguish between the "What's New" items.

Also interesting is that the site does not use much movement to distinguish certain sections. The moving text in the introduction for each vehicle section is nice, but the text is always a dark gray. And the site could use lots more movement with the Imagine TV page when users click on the remote control, but they have ignored that usage. Lastly, the site is generally too graphics-heavy. There are not a lot of text equivalents, so navigation becomes a problem, like on the Showroom page. This is aggravated even more by the haphazard use of alt text for graphics. In any event, the main page's graphics may be slightly excused since it is the main page and is trying to set a mood. But subsequent pages are even more graphics intensive and can require quite a long time to download since most of the text is included in the graphics.

The Mercury site designers do a decent job at making a site that follows Tufte's principles. The site scored a total of 306 out of a possible 390 points. This puts the site at overall score of 8. It could get to the 9 score by merely slight improvements in the discussed areas, and with better layering and separation design in general.

Navistar

The International site from Navistar is available at http://www.navistar.com. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is quite consistent with its own style and design. That consistency helps to make it one of the better sites, although definitely not one of the top 10 sites in the group.

The scores for Navistar are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	6
Consistent Theme	9
Consistent Site	7
Page Titles	9
Space Well Used	8
Avail of Navigation	3
Languages	2
Languages Separate	1
TOTAL	51

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	10
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	7
Interactive Elements	3
TOTAL	69

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	10
Important First	5
Headings Used	5
Chunking	9
Horizontal Rules	7
TOTAL	46

Color	Score
Avg. # of Colors	6
Consistent Use	4
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	45

Small Multiples	Score
User Controls	7
Default New Move	6
Repeated Banner	7
Repeated Logo	8
Repeated Icons	10
Repeated Nav Devices	7
Graphic Color Theme	6
TOTAL	51

The site designers use a simple white background and repeating the navigation icons on every page. The flow of text with graphics is also quite impressive. This can be seen in the banners for each page, where the heading information and the default next move text are included to help the user navigate the site. Equally impressive is the excellent ratios of text to graphics throughout the site. They need to improve, though, in making those repeated navigation items more available so the user does not need to scroll so much. They can do this with frames, by putting the links at the top or left of the page, or by shrinking the banner graphics so that they don't take up a full screen by themselves. Color use in general is the site's main weakness, as it has the lowest score here out of all other American sites. It would also be nice if the site had international versions of the pages, especially since that is the brand name of the vehicles. The

other area that needs significant help is making the site more interactive than just a simple form for making comments or asking a question.

The site scores quite low in layering and separation design, yet it is consistent in at least scoring a 5 in each category. The site could definitely use a site map to help differentiate the chunks of information available (or at least a site search feature). There are so many navigation icons and choices, that it can be a bit overwhelming at times for the reader. Also overwhelming are the many headings and levels of headings that all look similar, so that it is hard to tell how deep you are in the site. This is evident in the corporate section, where Navistar in the News and Navistar Locations look like different depths according to the word styling, but then they receive equal treatment on the resulting pages.

The site has been designed to have lots of colors to help enliven the site. Yet, these colors are used haphazardly, with no apparent rhyme or reason. The colors of the navigation icons hardly ever match the banner background color, for instance. An example of this is the Parts section, with its orange icon and the purple banner. So, though the color use in the icons is clever, tying road sign colors to site sections, the concept has not been carried through to the actual content pages.

The Navistar site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 262 out of a possible 390 points. This puts the site at a solid 7. It would take quite a bit of redesign work to bring the site up to the next level, but it could be done with closer attention to color use, and better micro/macro design.

Oshkosh

The Oshkosh site is available at http://www.oshkoshtruck.com. The site seems to have an average design as well that makes fairly consistent use, although only slightly above average, of the design principles discussed in this thesis. The scores for Oshkosh are as follows:

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	10
Important First	7
Headings Used	7
Chunking	9
Horizontal Rules	8
TOTAL	55

Small Multiples	Score
User Controls	6
Default New Move	3
Repeated Banner	8
Repeated Logo	10
Repeated Icons	8
Repeated Nav Devices	9
Graphic Color Theme	10
TOTAL	54

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	7
Consistent Theme	7
Consistent Site	8
Page Titles	3
Space Well Used	5
Avail of Navigation	9
Languages	2
Languages Separate	1
TOTAL	48

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	8
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	4
Links Explained	5
Interactive Elements	4
TOTAL	61

Color	Score
Avg. # of Colors	8
Consistent Use	8
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	4
TOTAL	52

The site designers do well overall with layering and separation. The site uses a simple background, has lots of good chunking, and makes repeated use of the company logo on every page. Additionally, the ratios of text and graphics are wonderful, allowing for fairly fast page load times while breaking up the monotony of straight text. The graphic color scheme is equally nice, as the graphics emphasize either the type or vehicle, or the corporate colors of orange and black. They need to improve the page titles by varying to something besides “Welcome to Oshkosh,” include culture-specific versions of the pages, and provide a better default new move design. As it is, users must scroll down to the bottom or the main framed page to find the next set of links. Also, color is used only for showing reality in the vehicle pictures. This could be improved by making the vehicle type color more evident in each group, and by using color more in the headings or text to highlight important pieces of information.

The site design makes average use of space on each page. For example, on the Defense Vehicles page, the main content flows down the right side of the page, but it does not flow around the graphic to its left, thus causing the page to be longer than needed, and by extension, the section links to be farther away. Another area where the design could be improved is with color and movement. The design uses about 10 colors, and does so fairly consistently, but no color is used effectively to help with movement or interaction

with the user. Besides the color associated with link clicking, the only movement comes on the Commercial Vehicles page, where the "Available Now" text jumps a little every so often. This is so unexpected, and the animation so far apart, that it is easy to miss and hardly attracting for viewers. Finally, the site needs to improve its explanations of links. For example, a link near the bottom of the main page simply says to "click here" for more information. The user must read the entire section before to understand the context of this link.

The Oshkosh site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 270 out of a possible 390 points. This puts the site at overall score of 7, but fairly close to an 8. It also falls very close to the average score for all sites, 270.68, proving that it is indeed average among all sites.

Plymouth

The Plymouth site is available at http://www.plymouthcars.com. This site provides a great example of good, consistent above-average design. Although it is not in the top 10 of all sites, it does come close, and it scores well in most categories.

The scores for Plymouth are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	9
Consistent Site	6
Page Titles	5
Space Well Used	5
Avail of Navigation	10
Languages	10
Languages Separate	10
TOTAL	72

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	10
Deliberate Placement	5
Ratio Graphics: Text	6
Ratio G:T Main Page	4
Use of Text and	7
Links Explained	9
Interactive Elements	8
TOTAL	64

Layer and Separation	Score
Site Map	6
Search or Index	5
Simple Background	9
Important First	10
Headings Used	10
Chunking	10
Horizontal Rules	8
TOTAL	58

Small Multiples	Score
User Controls	10
Default New Move	9
Repeated Banner	4
Repeated Logo	6
Repeated Icons	8
Repeated Nav Devices	10
Graphic Color Theme	8
TOTAL	55

Color	Score
Avg. # of Colors	10
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	8
TOTAL	59

The site designers receive top marks in many categories across all the principles. First of all, the site provides a World Links link at the bottom of every page, which can take the viewer to any number of culture-specific sites. The main page is also kept quite short, both the splash screen and the actual main content page, so that it is easy to see all options in a single glance. In layering and separation, the design shows great use of headings and placing important information first, as well as excellent chunking of information in logical units. You can see this best on the site map page, where the heading levels are evident from the section banners down to the subheadings. For the small multiple design, the designers show excellence in allowing easy access to all areas of the site through multiple paths, and then with using repeated navigation icons for the uppermost site sections on every page. Then, for the color principle, the designers choose to use a limited number of colors consistently throughout the site, including dark blue for the logo, maroon for subsection banners, black for text, white for the background, and gray for movement. Finally, the site's integration of text and graphics is exemplified in the text flow around graphics, as seen on the How to Shop page, and fairly well with link explanations, also evidenced on the How to Shop page as the text describes what is available in each of the subsections listed in the top of the page.

Of course, no site is perfect, and this site offers no exception to the rule. The site could use improvement in a few specific categories that would put it up closer to the top of all the sites. The site does not use repeated page banners to tie the design and site together. Although each page has a banner, each one looks different and doesn't help the viewer easily identify the page as belonging to the site. As a result, it is easy to miss that the World Links link takes the user to a Chrysler corporate page. Additionally, the graphics do not all have alt text, nor are they placed deliberately on the page with width and height attributes. This results in some disconcerting shifting of text and other images as the respective images load on the page. It would also be useful to provide page titles that describe the specific page instead of just the

company name and year. At the least, it would encourage visitors to return more than once per year. Finally, the site is a bit graphics-heavy, and so the shifting of text and graphics mentioned previously is aggravated even further than if the site had more text.

The Plymouth site designers do a good job at making a site that follows Tufte's principles. The site scored a total of 308 out of a possible 390 points. This puts the site at a solid score of 8. It gets this score because the design does not have any major problems, and the few problems that it does have are not significant.

Saturn

The Saturn site is available at http://www.saturn.com. The design of this site is also average, with lots of great scores and lots of mediocre or poor scores. The scores for Saturn are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	7
Site Purpose	9
Consistent Theme	8
Consistent Site	8
Page Titles	8
Space Well Used	7
Avail of Navigation	2
Languages	6
Languages Separate	9
TOTAL	64

Text and Graphics	Score
Combined?	6
Graphical Nav	2
Text Flow	6
Deliberate Placement	8
Ratio Graphics: Text	8
Ratio G:T Main Page	4
Use of Text and	6
Links Explained	6
Interactive Elements	7
TOTAL	53

Layer and Separation	Score
Site Map	8
Search or Index	4
Simple Background	9
Important First	7
Headings Used	8
Chunking	6
Horizontal Rules	5
TOTAL	47

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	10
Color and Movement	7
TOTAL	59

Small Multiples	Score
User Controls	5
Default New Move	7
Repeated Banner	7
Repeated Logo	9
Repeated Icons	2
Repeated Nav Devices	4
Graphic Color Theme	10
TOTAL	44

The site designers score well with some of the design categories, although they only scored perfectly in three categories. Also, the site's color design is the best aspect of all the other principles. The site does well with keeping the cultural sites for Canada and Japan separated, but the link is hard to find (it is on the Directory page). The background is also very simple. It could be slightly improved by using the same background for the navigation frame as the other frames, or at least stick with the white background, or maybe a gray background to tie in with the corporate colors more. The "pin" icon is often repeated, although since it is used for many things, it does not serve to distinguish content or context. However, the corporate logo is repeated, with only slight variations in size or location. The site does a great job with limiting the number of colors that are used in the site to a manageable 7, including pink for background, white for background, and gray for headings and visited links.

They need to improve the navigation structures used. The main page uses a framed navigation area to presumably make it easier to get to, however the number of items in the frame is so great that the user must scroll through almost three screens of links to see them all. This is partly a spacing problem (there is a lot of wasted white space and unnecessary pin icons), partly a text problem since each link is encased within a descriptive sentence (this is a great idea for links on main pages, but does not work well with navigation), and partly a scope problem since there are so many links (and several could be removed or simply highlighted in the main content frame instead, such as the Martha Finney link). These things alone make navigating from the main page a chore. But, they don't even use the navigation again. The navigation schemes for the other pages put the frame at the bottom, with only a few links, and a completely different design. It is also strange that the pin graphic design does not show up in other areas of the site (it does show up as a stickpin in a few places, but not the pushpin that was so prominent on the main page.

The Saturn site designers have done a few things well, like explaining the purpose of the site, and supplying a link to a kind of site map directly from the first page. However, the site needs more work with navigation and repetition of themes to improve the site overall. The site scored a total of 267 out of a possible 390 points. This puts the site at a solid 7.

Superior

The Superior site is available at http://www.customwheels.com/superior. The site seems to mainly be just an online brochure, with limited user interactivity. It is obviously very specific and directed toward a specific customer, though, and so it is fairly easy to use.

The scores for Superior are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	10
Consistent Site	7
Page Titles	4
Space Well Used	6
Avail of Navigation	4
Languages	2
Languages Separate	1
TOTAL	51

Text and Graphics	Score
Combined?	6
Graphical Nav	10
Text Flow	8
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	9
Links Explained	5
Interactive Elements	3
TOTAL	60

Layer and Separation	Score
Site Map	5
Search or Index	6
Simple Background	9
Important First	5
Headings Used	4
Chunking	2
Horizontal Rules	2
TOTAL	33

Color	Score
Avg. # of Colors	6
Consistent Use	9
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	48

Small Multiples	Score
User Controls	4
Default New Move	9
Repeated Banner	9
Repeated Logo	9
Repeated Icons	6
Repeated Nav Devices	8
Graphic Color Theme	10
TOTAL	55

The site's strongest aspects revolve around small multiple design, like the repeated banner and logo, and integration of text and graphics, especially the use of the actual wheel rim as the navigation item. They need to improve the layering and separation of the content in the site.

The site's start page is a kind of splash screen, with just a single link on it to take the user to the brochure page. Although this is a bit primitive in relation to what they could do, it is effective because it

loads quickly and tells the user exactly what they can expect when they get to the other side of the link. The navigation scheme on the next page is also quite useful since each item is preceded with a picture of the actual item. The designers would have done even better if they had used the same technique for the catalog section.

The catalog has navigation problems of other kinds, as well. The user must scroll down to the bottom of the page to select the next button, the Price and Sizes and Get More Info links both point to the same place so at least one of them is superfluous, and the Next button always works (even at the end of the catalog: it just cycles through to the beginning again) and so can go on infinitely. The information page shows that Superior has presences in Mexico and Hungary, so it is also surprising that they do not have Spanish or Hungarian versions of the site. The site can also use some well-placed horizontal rules to better separate the content and information for each rim (for example, the availability paragraph is closer to the name of the next rim in the list, and could be mistaken as applying to that rim instead of the one it is actually for. More white space between entries may also help fix this problem. Lastly, the site lacks many of the common web interactions that would make this more than just an online version of the paper brochure. The site does employ some links, but there are no email contact addresses and users must contact the company by phone or mail to get pricing or availability information.

The site is easily and quickly accessed, despite some navigation problems and little interactivity. It scored a total of 247 out of a possible 390 points, for a score in the low 7 range.

Titan

The Titan site is available at http://www.bikersdreamaz.com/titan.html. The site lacks many of the features common to well-designed sites. The site is mainly just a conversion from a brochure, with little regard for the benefits associated with the hypertext medium. The scores for Titan are as follows:

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	10
Important First	6
Headings Used	4
Chunking	4
Horizontal Rules	7
TOTAL	41

Small Multiples	Score
User Controls	6
Default New Move	5
Repeated Banner	2
Repeated Logo	5
Repeated Icons	10
Repeated Nav Devices	6
Graphic Color Theme	10
TOTAL	44

Micro/Macro	Score
Avg. Screen/ Main Page	1
Site Purpose	1
Consistent Theme	7
Consistent Site	6
Page Titles	5
Space Well Used	8
Avail of Navigation	7
Languages	2
Languages Separate	1
TOTAL	38

Text and Graphics	Score
Combined?	6
Graphical Nav	4
Text Flow	5
Deliberate Placement	8
Ratio Graphics: Text	8
Ratio G:T Main Page	8
Use of Text and	8
Links Explained	10
Interactive Elements	3
TOTAL	60

Color	Score
Avg. # of Colors	8
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	52

The site designers do the best with the aspects of small multiples, including the repetition of icons and a good graphic color theme. They also scored well with the color categories, however, since 20 of the points are given in this area automatically, it hardly seems earned. They need to improve the most in the micro/macro design area, especially in average number of screens for the main page and defining and presenting a site purpose.

The designers did well to use a plain white background on all the site's pages. This helps to avoid the cluttered feeling that often happens with brochure-sites like this one. Also on the positive side, the design has a fairly consistent use of color, using only about ten different colors on average, including the following: white for background, black for text, red for logo and rules, blue for links, purple for visited links, and silver for motorcycle hardware. Finally, the links that do appear on the site's pages are all very well explained. This helps to alleviate some of the confusion that is caused when clicked links open a new window.

The top three changes that would help this site are to break up the main page into shorter pages and include some navigation structure, define a site purpose and state it on the site, and add more interactivity (especially color and movement). The main page takes up about eight screens of information.

This could be easily split up into motorcycle type sections and a company information area, which would be a perfect location for a statement of the site's purpose. By adding some more movement to accentuate the colors, the designers would craw the viewer into the site more. Possibilities include dynamic image resizing, a 3-D banner, or a form for requesting more information.

The Titan site designers do an average job at making a site that is useful for their audience. The site scored a total of 235 out of a possible 390 points. This puts the site at overall score of 6. It gets the 6 mainly because of average and below average scores in most categories in micro/macro design and integration of text and graphics.

Tyres

The Tyres site is available at http://www.tyres1.com. This site scored almost the same as the Titan site, but this design seems to take more advantage of Internet technologies instead of just making a site out of the company brochure. Unfortunately, the design choices are not always appropriate for an international, multicultural audience.

The scores for Tyres are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	3
Site Purpose	7
Consistent Theme	8
Consistent Site	7
Page Titles	10
Space Well Used	8
Avail of Navigation	3
Languages	2
Languages Separate	1
TOTAL	49

Text and Graphics	Score
Combined?	9
Graphical Nav	2
Text Flow	7
Deliberate Placement	4
Ratio Graphics: Text	8
Ratio G:T Main Page	8
Use of Text and	4
Links Explained	5
Interactive Elements	3
TOTAL	50

Layer and Separation	Score
Site Map	4
Search or Index	6
Simple Background	10
Important First	6
Headings Used	2
Chunking	2
Horizontal Rules	5
TOTAL	35

Small Multiples	Score
User Controls	3
Default New Move	4
Repeated Banner	10
Repeated Logo	10
Repeated Icons	1
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	47

Color	Score
Avg. # of Colors	10
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	1
TOTAL	52

Integration of text and graphics and the use of more graphics to help deliver the message are the strong points of this web site. Of significant interest, are the great use of page titles to inform the reader of location and context, a simple (although slightly bright and annoying) background, and the use of a repeated banner and logo and navigation to help the reader navigate the site effectively. They need to improve the most in layering and separation. The quickest fixes would be to do more chunking of information and to use better headings with those chunks to allow for easier scanning and access. As it is now, the site uses so many font sizes and bolding that it is difficult to know what is important and what should be read next. And, for a company called Tyres International, they do not supply any cultural page versions of the site that would indicate how International they truly are.

The Tyres site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 233 out of a possible 390 points. This puts the site at overall score of 6.

Wheatley

The Wheatley site is available at http://www.wheatley.com. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it slightly better than other sites. The scores for Wheatley are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	7
Consistent Site	9
Page Titles	9
Space Well Used	8
Avail of Navigation	2
Languages	4
Languages Separate	8
TOTAL	63

Text and Graphics	Score
Combined?	6
Graphical Nav	2
Text Flow	9
Deliberate Placement	4
Ratio Graphics: Text	8
Ratio G:T Main Page	6
Use of Text and	5
Links Explained	6
Interactive Elements	5
TOTAL	51

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	9
Important First	6
Headings Used	4
Chunking	4
Horizontal Rules	8
TOTAL	43

Color	Score
Avg. # of Colors	10
Consistent Use	9
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	9
Color and Movement	4
TOTAL	60

Small Multiples	Score
User Controls	4
Default New Move	4
Repeated Banner	6
Repeated Logo	6
Repeated Icons	1
Repeated Nav Devices	2
Graphic Color Theme	6
TOTAL	29

`The site designers received high mark for color use, but they need to work a lot on designing better small multiples. On the plus side, the design only uses about 6 colors, and those colors are used consistently across the site. They use red for the logo, gray for the background, black for text, blue for links, purple for visited links, and white (along with black) for illustrations. The design also does fairly well with using productive page titles like “Wheatley Product Sheet,” but not well with others like the home page that is just “WWW Heavy Duty Truck Information Center.” Although this is accurate and may help people get the right context, it does not repeat the company name and the WWW is extraneous. It is also very nice that the designers choose to use a light gray background that uses a very faint texture to help contrast with the data and let the user focus on the data. Finally, the designers do keep an appropriate distance between graphics and the text. For example, on the main page, the corporate truck logo is separated enough from the other headings to help it stand out and accentuate the headings it appears with.

The designers need to reuse the icons and navigation devices more. Currently, the site does not really use any icons, instead relying on plain text for navigation. The navigation is also not available from every page. Each subpage has a link back to the home page, but that is all. Then, on the home page, the user must scroll down a screen in order to get to the applicable navigation. Lastly, the site could be improved with more attention to chunking, so that data becomes easier to access and interpret. For example, the Product Information page could use some chunking to separate the various products into meaningful

subgroups that would make it easier to locate the appropriate part instead of having to guess on what the company named the item and where they put it in the alphabetized list.

The Wheatley site designers do an average job at making a site that follows Tufte's principles. It is also impressive that the site actually has a Spanish language version for international customers (even though the Spanish-version is only one page and basically just asks the person to email them for information. The site scored a total of 246 out of a possible 390 points. This puts the site at overall score of 7. It gets the 7 because of its strong scores for color use and its average scores in most every category.

American Sites Scores

This section provides tables of the scores for all the American sites so that you can compare the scores for the sites in one location to identify patterns and more easily make categorizations.

Table 36. American sites Micro/Macro scores

Micro/Macro

Web Site	Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate
AC Delco	9	6	6	7	8	5	10	2	1
Buick	10	1	8	7	7	8	10	2	1
Cadillac	10	1	8	7	9	8	8	2	1
Chevy	10	1	10	7	8	5	10	2	1
Chrysler	10	2	8	7	8	5	10	10	9
Dynacorn	6	7	5	6	7	4	2	2	1
Ford	10	8	9	9	10	10	10	10	9
GM	10	7	7	8	10	8	6	10	9
Gex	6	10	8	8	8	7	6	2	1
Harley	10	8	8	9	10	5	4	2	1
Isuzu	9	6	9	7	10	7	10	2	1
Jeep	10	7	9	10	5	8	10	10	10
Lexus	10	7	9	9	6	8	10	2	1
Mack	10	1	7	7	5	7	9	2	1
Mann	6	3	9	6	4	5	2	2	1
Mercury	9	7	10	9	4	8	6	10	9
Navistar	6	6	9	7	9	8	3	2	1
Oshkosh	6	7	7	8	3	5	9	2	1
Plymouth	10	7	9	6	5	5	10	10	10
Saturn	7	9	8	8	8	7	2	6	9
Superior	10	7	10	7	4	6	4	2	1
Titan	1	1	7	6	5	8	7	2	1
Tyres	3	7	8	7	10	8	3	2	1
Wheatley	9	7	7	9	9	8	2	4	8

Table 37. American sites Layering and Separation scores

Layering and Separation

Web Site	Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules
AC Delco	6	8	10	8	7	9	6
Buick	8	8	9	10	8	9	7
Cadillac	6	1	10	9	8	10	7
Chevy	7	7	10	10	7	9	2
Chrysler	5	8	8	8	8	9	7
Dynacorn	7	7	7	7	4	5	2
Ford	9	9	10	10	8	9	2
GM	8	9	10	7	8	9	2
Gex	9	9	5	6	7	6	9
Harley	9	9	9	9	5	9	7
Isuzu	1	6	10	8	7	9	8
Jeep	9	9	7	9	8	10	8
Lexus	9	6	9	10	5	9	2
Mack	4	4	5	8	6	9	4
Mann	8	8	10	7	4	4	5
Mercury	6	6	10	7	7	10	9
Navistar	5	5	10	5	5	9	7
Oshkosh	7	7	10	7	7	9	8
Plymouth	6	5	9	10	10	10	8
Saturn	8	4	9	7	8	6	5
Superior	5	6	9	5	4	2	2
Titan	5	5	10	6	4	4	7
Tyres	4	6	10	6	2	2	5
Wheatley	6	6	9	6	4	4	8

Table 38. American sites Small Multiples scores

Small Multiples

Web Site	User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme
AC Delco	10	9	9	10	4	8	4
Buick	7	5	6	10	3	8	6
Cadillac	9	9	7	7	6	9	8
Chevy	7	5	6	9	8	6	6
Chrysler	6	9	10	10	9	9	9
Dynacorn	4	4	6	4	2	2	4
Ford	10	9	4	10	9	9	10
GM	7	6	8	10	10	10	8
Gex	6	10	9	10	9	8	6
Harley	7	8	10	10	9	10	9
Isuzu	6	5	9	9	7	9	6
Jeep	10	8	9	10	10	10	9
Lexus	10	8	7	3	10	10	8
Mack	6	6	3	4	2	6	6
Mann	6	7	8	10	2	9	8
Mercury	9	6	7	9	6	8	9
Navistar	7	6	7	8	10	7	6
Oshkosh	6	3	8	10	8	9	10
Plymouth	10	9	4	6	8	10	8
Saturn	5	7	7	9	2	4	10
Superior	4	9	9	9	6	8	10
Titan	6	5	2	5	10	6	10
Tyres	3	4	10	10	1	10	9
Wheatley	4	4	6	6	1	2	6

Table 39. American sites Color scores

Color

Web Site	Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Background Color	Color Scheme	Text Contrast w/Background	Color & Movement
AC Delco	10	6	6	10	10	8	9
Buick	6	8	6	10	10	5	10
Cadillac	10	8	6	10	10	8	3
Chevy	10	6	8	10	10	8	4
Chrysler	10	8	8	10	10	8	9
Dynacorn	8	6	4	10	10	7	1
Ford	8	9	6	10	10	8	10
GM	6	6	10	10	10	6	4
Gex	6	6	8	10	10	4	7
Harley	8	8	8	10	10	6	4
Isuzu	8	6	10	10	10	8	8
Jeep	8	10	8	10	10	7	10
Lexus	10	8	8	10	10	6	7
Mack	10	8	6	10	10	5	4
Mann	8	6	8	10	10	8	5
Mercury	8	9	6	10	10	8	6
Navistar	6	4	6	10	10	8	1
Oshkosh	8	8	4	10	10	8	4
Plymouth	10	9	6	10	10	6	8
Saturn	10	6	6	10	10	10	7
Superior	6	9	4	10	10	8	1
Titan	8	9	6	10	10	8	1
Tyres	10	9	6	10	10	6	1
Wheatley	10	9	8	10	10	9	4

Table 40. American sites Integration of Text and Graphics scores

Integration of Text and Graphics

Web Site	Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements
AC Delco	9	5	7	8	10	4	6	4	7
Buick	9	7	10	10	6	4	5	7	8
Cadillac	9	7	7	5	10	6	8	3	5
Chevy	9	6	10	10	10	4	9	8	7
Chrysler	9	6	10	7	10	4	7	8	8
Dynacorn	3	2	8	7	10	8	7	6	5
Ford	10	10	10	10	10	4	6	4	9
GM	6	7	7	4	10	6	5	5	8
Gex	6	5	10	8	10	10	9	5	4
Harley	9	10	8	9	6	10	4	8	5
Isuzu	9	7	10	8	10	6	7	7	5
Jeep	9	8	9	8	4	4	7	8	8
Lexus	9	7	10	5	10	4	8	8	7
Mack	7	5	8	5	10	10	6	5	3
Mann	9	6	7	5	8	10	4	6	6
Mercury	8	7	10	8	6	6	8	7	8
Navistar	9	7	10	5	10	10	8	7	3
Oshkosh	8	7	8	5	10	10	4	5	4
Plymouth	8	7	10	5	6	4	7	9	8
Saturn	6	2	6	8	8	4	6	6	7
Superior	6	10	8	5	10	4	9	5	3
Titan	6	4	5	8	8	8	8	10	3
Tyres	9	2	7	4	8	8	4	5	3
Wheatley	6	2	9	4	8	6	5	6	5

Table 41. American sites total scores

Site	Total 1	Total 2	Total 3	Total 4	Total 5	Grand Total	Overall Score
AC Delco	54	54	54	59	60	281	8
Buick	54	59	45	55	66	279	7
Cadillac	54	51	55	55	60	275	7
Chevy	54	52	47	56	73	282	8
Chrysler	69	53	62	63	69	316	8
Dynacorn	40	39	26	46	56	207	6
Ford	85	57	61	61	73	337	9
GM	75	53	59	52	58	297	8
Gex	56	51	58	51	67	283	8
Harley	57	57	63	54	69	300	8
Isuzu	61	49	51	60	69	290	8
Jeep	79	60	66	63	65	333	9
Lexus	62	50	56	59	68	295	8
Mack	49	40	33	53	59	234	6
Mann	38	46	50	55	61	250	7
Mercury	72	55	54	57	68	306	8
Navistar	51	46	51	45	69	262	7
Oshkosh	48	55	54	52	61	270	7
Plymouth	72	58	55	59	64	308	8
Saturn	64	47	44	59	53	267	7
Superior	51	33	55	48	60	247	7
Titan	38	41	44	52	60	235	6
Tyres	49	35	47	52	50	233	6
Wheatley	63	43	29	60	51	246	7

Mexican Sites Microscopic Analyses

I selected 24 Mexican automobile manufacturer web sites for this study (I couldn't find any sites for auto makers). I tried to select seemingly popular sites as well as those that were not well known so as to get a better sampling of the range of sites and designs out there. The sites discussed in this section that have multiple raters are Arbo Mex, Mondial, Moto Roma, and Piso.

Ahmsa

The Ahmsa site is available at http://www.ahmsa.com. This site is one of the best out of the Mexican sites, and it also scored quite well in almost all the categories. While it does not have a perfect design, it is quite clean and easy to use.

The scores for Ahmsa are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	9
Consistent Site	9
Page Titles	5
Space Well Used	8
Avail of Navigation	8
Languages	4
Languages Separate	4
TOTAL	63

Text and Graphics	Score
Combined?	10
Graphical Nav	7
Text Flow	10
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	8
Links Explained	6
Interactive Elements	4
TOTAL	66

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	10
Important First	6
Headings Used	8
Chunking	9
Horizontal Rules	7
TOTAL	54

Color	Score
Avg. # of Colors	8
Consistent Use	9
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	1
TOTAL	52

Small Multiples	Score
User Controls	9
Default New Move	8
Repeated Banner	7
Repeated Logo	9
Repeated Icons	8
Repeated Nav Devices	9
Graphic Color Theme	10
TOTAL	60

The site designers are adept with small multiple design and with integration of text and graphics. Specifically, the site's graphic color theme is quite consistent and is used for decoration and functional purposes. Users readily notice that the navigation graphics are simply smaller pieces of larger graphics that appear in the appropriate section. The colors and images ground the site in the industrial industry; yet tie in well with the technological age of the Internet. The graphics are emphasized even more by the use of a simple, white background. Additionally, the designers do a great job with combining the text and graphics, especially in the navigation buttons and headers, and flowing the other text around the graphics in a consistent, reliable manner so that the right information is highlighted at the right time. Finally, the designers strike the right balance between graphics and text throughout the entire site.

Areas where the site can be improved are in using the interactivity of the web more to engage the user and in the use of separate language versions. The site feels very static. The only interactivity allowed is in navigation and on the Information Request page (although here the actual return interaction is delayed until the company can "get back to" the customer quickly. The site also only scored 4s for the cultural versions of the site. While not horrible, most other scores for the site were a 6 and above. The main problem is that the site uses some Spanish throughout the English site, without providing a pure Spanish version.

The Ahmsa site designers do a good job at making a site that follows Tufte's principles. The site scored a total 295 out of a possible 390 points. This puts the site at an overall score of 8. It also falls well above the median score for all Mexican sites, 253. This shows that it is indeed quite good among its peers, and indeed above average for all sites (270.68 average and 267.5 median).

Alfa Nemak

The Alfa Nemak site is available at http://www.alfa.com.mx/inf97en/versax.htm. The site seems to have an average design and does little more than provide a corporate overview. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better Mexican sites. The scores for Alfa Nemak are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	1
Consistent Theme	10
Consistent Site	6
Page Titles	7
Space Well Used	7
Avail of Navigation	7
Languages	4
Languages Separate	8
TOTAL	59

Text and Graphics	Score
Combined?	10
Graphical Nav	6
Text Flow	9
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	6
Interactive Elements	3
TOTAL	67

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	10
Important First	6
Headings Used	4
Chunking	4
Horizontal Rules	9
TOTAL	47

Small Multiples	Score
User Controls	6
Default New Move	8
Repeated Banner	3
Repeated Logo	2
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	10
TOTAL	47

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	9
Color and Movement	1
TOTAL	52

The site designers use a consistent graphic theme and site theme. Of course, the site only has about 5 pages total, but at least the designers resisted the urge to use five different designs. The background helps to make the site look more professional since it has the ledger look with the dark left navigation border. The designers also limit the number of colors and use those colors in a consistent manner. Therefore, radical color palettes and so forth do not confuse the user. Interestingly, the designers placed a "Best Viewed with Thousands of Colors" disclaimer on the main page. However, this site works just as well with the standard 256 web-safe colors. Finally, the designers mix just enough text in with the graphics to create nice ratios throughout the entire web site and on the main page.

They need to improve in a few key areas: the site's purpose is not stated and the data on the web site does not seem to contribute any to the proposed tag of being "Mexico's leading industrial concern". Secondly, the site is even more static than the Ahmsa site. There are a limited number of links and only a single contact email link for the Webmaster. Lastly, the designers need to do more with repeating the corporate logo on all the pages to help branding and repeating banners so the site seems more structured and thought-out.

The Alfa Nemak site designers do a fairly good job at making a site that is usable by a broad English-speaking audience. The site scored a total of 272 out of a possible 390 points. This puts the site at an overall score of 7. It gets the 7 because of a significant lack of repetition in logo and banner use that contributes to a fairly low small multiples score. It's strengths lie more in text and graphic integration. It also falls very close to the median score for all sites, 267.5, and almost attains the median (281.5) and the average (280.27) scores for America and Korea together.

Aral Mex

The Aral Mex site is available at http://www.ina.com.mx/expo/aralmex/. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better Mexican sites, although definitely not one of the top 10 sites in the group.

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	1
Consistent Theme	10
Consistent Site	6
Page Titles	5
Space Well Used	8
Avail of Navigation	4
Languages	4
Languages Separate	8
TOTAL	54

Text and Graphics	Score
Combined?	3
Graphical Nav	2
Text Flow	9
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	7
Links Explained	6
Interactive Elements	3
TOTAL	55

Layer and Separation	Score
Site Map	8
Search or Index	8
Simple Background	7
Important First	9
Headings Used	4
Chunking	4
Horizontal Rules	7
TOTAL	47

Color	Score
Avg. # of Colors	8
Consistent Use	4
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	5
Color and Movement	1
TOTAL	46

Small Multiples	Score
User Controls	6
Default New Move	8
Repeated Banner	2
Repeated Logo	9
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	51

The site designers are strong in a couple categories. As with most other Mexican sites, this site does very well with providing a great ratio of text to graphics across the entire site and on the main page. This helps to enliven the site and make it more interesting. The site also has a consistent theme across all the site's pages. The theme is mainly just the company name that is repeated over and over as the background image to the pages, and the use of red and yellow for links to tie in with the corporate color theme.

They need to include a site purpose somewhere in the site so that it is obvious why they have a web site in the first place. They also need to take better advantage of web technologies and make the site more interactive, integrating color and movement better to draw the reader's eyes. Surprisingly, the designers did not consistently repeat any page banners. It is surprising because they consistently repeated the logo, icons, and navigation devices.

The Aral Mex site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 253 out of a possible 390 points. This puts the site at overall score of 7. It falls at the median score for all Mexican sites. This shows that it is indeed quite average.

Arbo Mex

The Arbo Mex site is available at http://lelaya.teesa.com/arbomex/. This is a site that does quite well in several areas, poorly in a few other areas, and mediocre in all the rest. This combination puts in on par for a very average site, but one that can make small, incremental changes that would have a drastic effect. The scores for Arbo Mex are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	6	6	6	6	6	0
Site Purpose	1	1	3	1	1	0.5
Consistent Theme	7	7	8	7	8	-0.75
Consistent Site	8	7	7	6	6	1
Page Titles	4	4	4	4	4	0
Space Well Used	3	3	5	3	4	-0.5
Avail of Navigation	2	2	5	2	2	0.75
Languages	4	4	4	4	4	0
Languages Separate	8	8	8	8	8	0
TOTAL	43	42	50	41	43	1

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	6	5	5	5	5	0.25
Search or Index	5	5	5	5	5	0
Simple Background	9	8	10	10	10	-0.75
Important First	2	1	5	2	2	0.5
Headings Used	4	4	4	4	4	0
Chunking	8	6	7	7	7	0
Horizontal Rules	10	10	8	8	8	1
TOTAL	44	39	44	41	41	1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	4	5	4	4	4	0.25
Default New Move	9	10	9	10	10	-0.5
Repeated Banner	1	1	2	2	2	-0.5
Repeated Logo	6	6	6	6	6	0
Repeated Icons	5	4	4	3	4	0
Repeated Nav Devices	8	7	9	7	7	0.75
Graphic Color Theme	9	8	9	10	10	-1
TOTAL	42	41	43	42	43	-1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	10	10	10	10	10	0
Consistent Use	4	4	6	4	4	0.5
Color Used	8	8	8	8	8	0
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	10	9	8	10	10	-0.75
Color and Movement	9	10	8	10	10	-0.75
TOTAL	61	61	60	62	62	-1

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	4	4	3	4	3	0.75
Graphical Nav	8	8	8	8	8	0
Text Flow	8	8	7	7	8	-0.5
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	10	10	8	10	10	-0.5
Ratio G:T Main Page	4	4	6	4	4	0.5
Use of Text and	6	8	6	6	7	-0.5
Links Explained	8	8	8	7	7	0.75
Interactive Elements	7	7	5	7	7	-0.5
TOTAL	65	67	61	63	64	0

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	255	250	258	249	253	0

Color use and text and graphic integration are the specific principles that this site excels in. The designers use a light gray, textured background, which contrasts well with the dark black text. The texture is very light and so does not interfere with the text, while providing depth to the page. The site uses color and movement in only one graphic for the Contact Us link, but the colors are only black and white, so it is not too disconcerting, and it helps draw the user's attention. It is especially nice that it does not appear on the first screen of information, so that the reader can look at the other data before having their eyes drawn away by the animation. Additionally, the graphics are all placed on a specific spot on the page, with height and width elements and the important alt attribute. Finally, they have struck a good balance between the

ratios of text to graphics on average throughout the site. While the use of huge graphics at the top of each page is not ideal since the user must scroll to see the entire graphic, it pretty much mirrors the amount and space needed for the textual data.

They need to improve significantly in one specific area: include a purpose statement for the site. The site's navigation, although existent, is not ideally located nor indicated. It is not immediately obvious that the "Previous Page" and "Next Page" links actually correspond to the main sections identified on the cultural site's main page. The designers have created a site that is lineal rather than one that takes advantage of the non-linear possibilities of hypertext. Along with the problem of the large banner graphics goes the problem of putting the important information first. While the graphics certainly help to enliven the site, they should not be the dominant feature, and they should not need to be so large. Also, the banners are inconsistent and are mainly just there as decoration instead of supplying information and data about the page.

The Arbo Mex site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 253 out of a possible 390 points. This puts the site at overall score of 7. It gets the 7 because of its strength in color use and text and graphic integration. Similar to Aral Mex, it receives the same score as the median score for all Mexican sites. This shows that it is indeed quite average.

Baleromex

The Baleromex site is available at http://viernes.iwm.com.mx/servicios/baleromex/. The site makes some of the poorest use of the design principles discussed in this thesis. However, this is partly caused by the fact that this is just a single page site.

The scores for Baleromex are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	1
Consistent Theme	10
Consistent Site	8
Page Titles	2
Space Well Used	5
Avail of Navigation	1
Languages	2
Languages Separate	1
TOTAL	36

Text and Graphics	Score
Combined?	4
Graphical Nav	1
Text Flow	6
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	6
Links Explained	6
Interactive Elements	7
TOTAL	55

Layer and Separation	Score
Site Map	1
Search or Index	1
Simple Background	10
Important First	5
Headings Used	3
Chunking	6
Horizontal Rules	2
TOTAL	28

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	62

Small Multiples	Score
User Controls	1
Default New Move	10
Repeated Banner	2
Repeated Logo	2
Repeated Icons	1
Repeated Nav Devices	1
Graphic Color Theme	10
TOTAL	27

Color is used judiciously throughout the site. This is easily seen in the graphic color theme, which, since there is only one page, is not too hard to maintain. The design only uses about 8 colors, and these are all used quite consistently, from the black for text to the red and silver and yellow for the bearings graphic. Also, since the site has only one page, it is not hard to tell that the ratios between text and graphics are quite even. The hardest part to score was how the site does for the default next move. But since there is basically only one link – for sending an email – it is quite easy to determine what the next move needs to be.

They need to improve in all the other main design principles, except for text and graphic integration, which is at least about average. The site lacks a purpose definition, which explains why it is only one page and has very little real data about the company or its products. Because it is just one page, there really are no navigation, site map, search or index, user controls, or any repeated small multiples except the little button graphics, which are not even used as list item buttons, but as a kind of table border for the data because it is just one page, so the site significantly suffers score-wise in these categories. The site scored the lowest of all Mexican sites in micro/macro and layering and separation, and scored the fourth lowest for small multiple design.

The Baleromex site designers do a poor job at making a site that follows Tufte's principles, since the site is only one page and only in Spanish. The site scored a total of 208 out of a possible 390 points. This puts the site at overall score of 6. It barely gets the 6 because of its strong color use and average

integration. This site is one of the reasons why the Mexican sites in general bring the total median and average scores down so much.

Clemex

The Clemex site is available at http://www.ina.com.mx/expo/clemex/clemex.html. The site is only slightly better than the Baleromex site. It did not receive lots of 1s as scores, though the scores were low overall, and it did not receive many 10s either. The scores for Clemex are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	1
Consistent Theme	5
Consistent Site	6
Page Titles	3
Space Well Used	7
Avail of Navigation	2
Languages	4
Languages Separate	8
TOTAL	44

Text and Graphics	Score
Combined?	3
Graphical Nav	2
Text Flow	6
Deliberate Placement	4
Ratio Graphics: Text	8
Ratio G:T Main Page	10
Use of Text and	6
Links Explained	6
Interactive Elements	3
TOTAL	48

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	7
Important First	9
Headings Used	4
Chunking	9
Horizontal Rules	3
TOTAL	44

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	7
Color and Movement	1
TOTAL	54

Small Multiples	Score
User Controls	4
Default New Move	5
Repeated Banner	2
Repeated Logo	2
Repeated Icons	1
Repeated Nav Devices	2
Graphic Color Theme	6
TOTAL	22

The main page has a good ratio of text and graphics so that this first page loads quickly. The designers also make good use of color, with only about six, and they use those six very consistently: green for the corporate color and background, black for most backgrounds, white for most text, yellow for unvisited links, blue for graphs, and silver for parts. The placing of important information in high-profile

areas is also done quite well, as can be seen on the secondary pages with the graphics helping to guide the reader's eyes along the text and to break it up into meaningful chunks.

They need to improve in small multiple design areas especially. The site would do much better if the designers used more repetition of elements to help tie the site together and to help the reader understand the data better. Another area for improvement is to include a purpose statement and then to stick close to that purpose in the design. Finally, the site does not use color and movement to its advantage, as the designers decided not to use movement in the site.

The Clemex site designers can improve the site in almost all areas, but some good small multiple design will go a long way towards helping this site be more conducive for an international audience. The site scored a total of 212 out of a possible 390 points. This puts the site at overall score of 6.

Dirona

The Dirona site is available at http://www.ina.com.mx/expo/dirona/. This site is another one of the average ones that do fairly well in most areas, but never great or really bad.

The scores for Dirona are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	9
Consistent Theme	7
Consistent Site	7
Page Titles	5
Space Well Used	5
Avail of Navigation	5
Languages	4
Languages Separate	8
TOTAL	59

Text and Graphics	Score
Combined?	3
Graphical Nav	3
Text Flow	9
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	9
Links Explained	6
Interactive Elements	4
TOTAL	55

Layer and Separation	Score
Site Map	8
Search or Index	8
Simple Background	5
Important First	5
Headings Used	8
Chunking	6
Horizontal Rules	9
TOTAL	49

Small Multiples	Score
User Controls	6
Default New Move	7
Repeated Banner	2
Repeated Logo	4
Repeated Icons	2
Repeated Nav Devices	8
Graphic Color Theme	7
TOTAL	36

Color	Score
Avg. # of Colors	10
Consistent Use	4
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	1
TOTAL	47

The site designers keep the number of colors small and use a good ratio of graphics to text of about 45%. They need to improve, however, in integrating more color and movement into the site so that it does not appear to be so static and leveled. In other words, everything has about the same amount of emphasis so it is difficult to determine where to start. Also, the design can be improved greatly with more consistent use of repetition, especially for banners and icons.

The Dirona site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 246 out of a possible 390 points. This puts the site at overall score of 7. It gets the 7 because it is at least consistent in its mediocrity. It also falls very close to the median score for all Mexican sites, 253. This shows that it is indeed quite average.

Enermex

The Enermex site is available at http://www.grupoimsa.com/enermex/. This site is not as consistent as Dirona in generating scores around 5 or 6. Instead, the scores fluctuate around 2 or 3 and 8 or 9. Interestingly, though, the site received almost the same final score as Dirona. So, while the Dirona designers need to improve the site in little ways in most areas, the Enermex designers only need to focus on improving the scores currently around 2 in order to get a significantly improved site.

The scores for Enermex are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	7
Site Purpose	1
Consistent Theme	10
Consistent Site	5
Page Titles	4
Space Well Used	7
Avail of Navigation	7
Languages	4
Languages Separate	8
TOTAL	53

Text and Graphics	Score
Combined?	7
Graphical Nav	7
Text Flow	4
Deliberate Placement	5
Ratio Graphics: Text	8
Ratio G:T Main Page	6
Use of Text and	5
Links Explained	3
Interactive Elements	3
TOTAL	48

Layer and Separation	Score
Site Map	1
Search or Index	1
Simple Background	8
Important First	9
Headings Used	8
Chunking	9
Horizontal Rules	5
TOTAL	41

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	10
Color and Movement	1
TOTAL	53

Small Multiples	Score
User Controls	6
Default New Move	4
Repeated Banner	4
Repeated Logo	9
Repeated Icons	10
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	50

The site designers excel in several areas, but they do the best with developing and using a consistent theme throughout the site. They also do generally well with repetition or key items, especially icons, as can be seen with the bulleted list item graphics on the secondary pages. And finally, the design maintains a good contrast of text against background with light pink background and the black text.

They need to improve, as most other Mexican sites, on incorporating a statement of purpose. Also, a site map would be helpful so as to get a better understanding of the depth of the site. As it is currently, the user has to go to a secondary page to get to any tertiary page. This causes problems for users because they do not understand the structure of the site and so do not know what section a certain item may fit under. The same can be said for having some sort of index or search capability. Finally, the site needs to do more with using movement and color to draw attention to key points or areas.

The Enermex site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 245 out of a possible 390 points. This puts the site at overall score of 7. It gets the 7 because of its higher number of highly scored categories.

Ferrocarril (Bolivia)

The Ferrocarril site is available at http://www.fcab.cl. The site in yet another of average design that makes semi-consistent use of the design principles discussed in this thesis, although it did not receive any perfect scores in any category, and just one score of 1.

The scores for Ferrocarril:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	8
Consistent Site	8
Page Titles	7
Space Well Used	7
Avail of Navigation	6
Languages	2
Languages Separate	1
TOTAL	55

Text and Graphics	Score
Combined?	6
Graphical Nav	3
Text Flow	6
Deliberate Placement	8
Ratio Graphics: Text	8
Ratio G:T Main Page	4
Use of Text and	6
Links Explained	6
Interactive Elements	5
TOTAL	52

Layer and Separation	Score
Site Map	8
Search or Index	5
Simple Background	7
Important First	9
Headings Used	6
Chunking	9
Horizontal Rules	5
TOTAL	49

Color	Score
Avg. # of Colors	4
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	8
TOTAL	52

Small Multiples	Score
User Controls	6
Default New Move	6
Repeated Banner	7
Repeated Logo	7
Repeated Icons	6
Repeated Nav Devices	2
Graphic Color Theme	4
TOTAL	38

The site designers keep the main page fairly short at about one and a half screens of information. While this is slightly long, most of the links and navigation appear in the top screen of the page. This is also an example of keeping the important information first and placing it in the key locations for users to see all at once. To do this effectively, the designers really need to do a lot of chunking into pieces of data that are easy to digest. The Ferrocarril designers do just that, and do a good job with breaking up the information onto separate pages and areas of the page. For example, the “Our Services” section has many subsections about the different services that they provide, rather than just listing each one on a single page of information.

They need to improve the site by including at least an English language version so that they can truly be an international company. The other major area of improvement needs to be a repetition of navigation devices. The main page and the “Our Services” pages have two different distinct navigation schemes that make it hard for the user to quickly and easily change over from the one to the other. This disconnect can be confusing and frustrating, and tends to drive readers away.

The Ferrocarril site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 246 out of a possible 390 points. This puts the site at overall score of 7. This puts it on the same level as Dirona and Enermex.

Filtros Mann

The Filtros Mann site is available at http://www.ina.com.mx/expo/filtrosmann/. This web site also balances several good scores against several poor scores. By working on the poor scores, the designers can greatly improve the site so it is more usable.

The scores for Filtros Mann are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	8
Consistent Theme	10
Consistent Site	8
Page Titles	7
Space Well Used	8
Avail of Navigation	3
Languages	2
Languages Separate	8
TOTAL	63

Text and Graphics	Score
Combined?	3
Graphical Nav	2
Text Flow	7
Deliberate Placement	7
Ratio Graphics: Text	8
Ratio G:T Main Page	6
Use of Text and	5
Links Explained	3
Interactive Elements	2
TOTAL	43

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	7
Important First	7
Headings Used	8
Chunking	9
Horizontal Rules	5
TOTAL	50

Small Multiples	Score
User Controls	7
Default New Move	6
Repeated Banner	1
Repeated Logo	2
Repeated Icons	1
Repeated Nav Devices	9
Graphic Color Theme	9
TOTAL	35

Color	Score
Avg. # of Colors	6
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	1
TOTAL	45

The maintenance of a consistent theme with horizontal dashes and construction sign-looking icons throughout most of the site is this site's main strength. The main page is longer than a full screen, but nothing in the bottom fourth is really important and necessary, so users will not scroll, and therefore not miss much. The design also has repeated navigation devices at the bottom of each page that look and behave exactly alike so users should be able to quickly understand their location, their next move, and where to go for the navigation. The site's scores for micro/macro and layering and separation are slightly above the average for the other Mexican sites.

They need to improve in color (where it is tied for lowest score) and integration of text and graphics (where it has the lowest score) so that it gets on par with the other excellent uses of these by other Mexican sites. The fact that these scores are low may indicate that someone other than a Mexican performed the design since the Mexican sites in general all scored well in these two principles. The designers need to finish up the English translation of the site so that they can get points in this category. A great way to make this site better is to use more repetition, especially for banners, icons, and the corporate logo, which only shows up on the main page.

The Filtros Mann site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 236 out of a possible 390 points. This puts the site at overall score of 6. It gets the 6 because of its poor showing for the color principle.

Hylsamex

The Hylsamex site is available at http://www.hylsamex.com.mx. This is one of the best sites reviewed in this thesis, including sites for America and Korea. Although it is not perfect, it is definitely one of the top ten or so sites available.

The scores for Hylsamex are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	7
Consistent Theme	9
Consistent Site	9
Page Titles	9
Space Well Used	8
Avail of Navigation	5
Languages	4
Languages Separate	8
TOTAL	69

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	10
Deliberate Placement	4
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	9
Links Explained	8
Interactive Elements	9
TOTAL	69

Layer and Separation	Score
Site Map	7
Search or Index	9
Simple Background	9
Important First	9
Headings Used	9
Chunking	10
Horizontal Rules	7
TOTAL	60

Color	Score
Avg. # of Colors	8
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	4
TOTAL	56

Small Multiples	Score
User Controls	10
Default New Move	5
Repeated Banner	9
Repeated Logo	9
Repeated Icons	8
Repeated Nav Devices	8
Graphic Color Theme	8
TOTAL	57

The site scored a 9 in 11 categories and a 10 in 5 other categories. It has the highest Mexican score for layering and separation and the third highest for integration of text and graphics. This site exemplifies good chunking techniques, as evidenced in the links to different sections from the Profiles page and the links to categorized areas of Products. The graphics and text flow around each other with perfect spacing so that it is easy to tell what belongs with what. For example, on the Profiles page, the text of the navigation graphics is close to the associated navigation graphic, while the large Hylsamex graphic near the company information text is far enough away so as to allow for easy reading of the text and still be loosely associated. Finally, the site's average ratio of text to graphics is a nice 50% so that neither one overburdens the other.

However, the site is not perfect. Although the lowest score it received was a 4, it received four of them. These categories are language, deliberate placement of graphics, ratio of graphics to text on the main page, and color and movement. The site is available in English and Spanish, but it may also be appropriate to add versions for other cultures and languages. Many of the graphics that occur in the site do not having any sizing or alt attributes, which slows down load times and causes items to appear to jump around the page as graphics resize and push things around. The ratio of graphics on the main page is simply too high. The page takes too long to load and many of the graphics are superfluous.

The Hylsamex site designers do a great job at making a site that follows Tufte's principles. The site scored a total of 311 out of a possible 390 points. This puts the site at an overall score of 8. It could get a 9 by doing more and better with color and Text and Graphic integration.

Intehc (Argentina)

The Intehc site is available at http://www.intehc.com. The site does not score fantastically in any one area, yet it also does not score poorly in more than a few categories. As such, it fits right in with the other average sites in the roundup.

The scores for Intehc are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	4
Site Purpose	9
Consistent Theme	10
Consistent Site	8
Page Titles	8
Space Well Used	4
Avail of Navigation	3
Languages	4
Languages Separate	1
TOTAL	51

Text and Graphics	Score
Combined?	8
Graphical Nav	5
Text Flow	9
Deliberate Placement	7
Ratio Graphics: Text	8
Ratio G:T Main Page	8
Use of Text and	8
Links Explained	3
Interactive Elements	5
TOTAL	61

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	7
Important First	8
Headings Used	4
Chunking	4
Horizontal Rules	7
TOTAL	44

Small Multiples	Score
User Controls	4
Default New Move	4
Repeated Banner	4
Repeated Logo	2
Repeated Icons	6
Repeated Nav Devices	6
Graphic Color Theme	8
TOTAL	34

Color	Score
Avg. # of Colors	8
Consistent Use	8
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	58

The site has a consistent theme across all the pages by using water drops. This works well with the site since it is for a car wash robot. They need to improve generally in layering and separation since the site scored in the middle or low in all the categories. Otherwise, the designers need to do better with separating the languages. They are one of the better multi-cultural sites, having Spanish, Portuguese, and English, but the Portuguese site is still under construction and the English is simply haphazardly mixed in with the Spanish. Finally, the design needs to integrate the corporate logo onto every page. By incorporating these changes, the designers can bring the site up to the next level.

The Intehc site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 248 out of a possible 390 points. This puts the site at overall score of 7. It also falls very close to the median score for all Mexican sites, 253. This shows that it is indeed quite average.

Mondial (Argentina)

The Mondial site is available at http://www.mondial-moto.com. The site is an example of a failure to incorporate Tufte's design principles, despite the use of good graphics and descriptive text. The site scored lots of 3s and 4s but also a lot of 10s, and so they balance each other out.

The scores for Mondial are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	4	4	4	4	3	1
Site Purpose	7	7	10	7	7	0.75
Consistent Theme	9	7	9	7	7	1
Consistent Site	5	7	8	8	8	-1
Page Titles	10	7	10	10	10	-0.75
Space Well Used	3	4	3	3	4	-0.75
Avail of Navigation	3	3	2	3	2	0.75
Languages	6	6	4	6	6	-0.5
Languages Separate	7	7	8	8	8	-0.5
TOTAL	54	52	58	56	55	0

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	6	6	6	6	6	0
Search or Index	6	6	6	6	6	0
Simple Background	10	6	10	10	10	-1
Important First	5	5	8	5	5	0.75
Headings Used	8	8	8	8	7	1
Chunking	4	5	4	4	4	0.25
Horizontal Rules	7	7	7	7	7	0
TOTAL	46	43	49	46	45	1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	7	7	6	6	6	0.5
Default New Move	7	7	6	6	6	0.5
Repeated Banner	4	3	4	4	4	-0.25
Repeated Logo	10	10	10	10	9	1
Repeated Icons	8	9	9	10	10	-1
Repeated Nav Devices	10	10	10	10	9	1
Graphic Color Theme	7	6	5	7	7	-0.75
TOTAL	53	52	50	53	51	1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	4	4	4	4	4	0
Consistent Use	5	4	9	5	5	0.75
Color Used	6	6	8	8	8	-1
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	7	8	8	-0.25
Color and Movement	1	1	1	1	1	0
TOTAL	44	43	49	46	46	-0.5

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	9	9	9	10	10	-0.75
Graphical Nav	7	7	10	7	7	0.75
Text Flow	9	9	6	7	7	0.75
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	10	10	8	10	10	-0.5
Ratio G:T Main Page	10	8	8	10	10	-1
Use of Text and	8	10	8	8	8	0.5
Links Explained	8	8	5	7	7	0
Interactive Elements	2	2	5	2	3	-0.25
TOTAL	73	73	69	71	72	-0.5

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	270	263	275	272	269	1

The design of this site is similar across all the design principles: average. The Mondial logo appears in large blue letters across the center of the Home Page. But it does not appear on any other pages. However, the very top graphic which tells that “Mondial es una Empresa de Alfa Comercial” is repeated on

every subsequent page. The designers of this site have also tried to employ some micro/macro design choices in putting the main section links on each page. But, while the graphics do create unity by their repetition, they are sometimes in the middle of the page in terms of horizontal and vertical alignment, and other times aligned to the right or at the bottom of the page. So, the congruity is lost by the varying placements. Finally, there is not a site map to give an overall picture of how the site is organized, so it seems disjoined and even haphazard.

Text is placed next to a graphic of a scooter on the Home Page, yet the text is aligned fairly close to the graphic, not leaving much separation. A horizontal rule is placed all the way across the page, separating the two sections, but the reason for this is not apparent, as the two sections are discussing the same topic. The designers have attempted to use headings to separate the content, such as the "Ultima Modificacion" and "Como Contactarnos" sections, which alternately separate the sections and hide the important information because of the long length of the pages. Unlike many of the other web sites, Mondial has opted to create long documents that make the reader scroll down to the bottom to get to any links or important information. However, the products are effectively separated from each other by horizontal rules and are centered within each section to create nice scan zones and a clear understanding of the layout for the reader.

Only the company header is repeated across the pages to create small multiples. Although the main link graphics are repeated, they always stay the same, not allowing the reader to know where they are at in the site. However, the use of these navigational graphics does aid the reader in knowing the extent (or lack thereof) of the web site. Even the headings across the top of the pages do not match the names given to them on the navigational menu. And the page banners do not use a consistent design.

Loud, bright colors are used everywhere: for page banners, for the navigational graphics, and for the vehicles. While the reality of the color for the vehicles is appropriate, the bright colors against the white background blur the edges of the fonts and make text fuzzy and hard to read. The designers did decide to maintain consistency with the links, as they are all blue for unvisited and purple for visited. This helps the reader to know where they have been so that exploration of the site is easier.

The designers have tried to integrate text and graphics, and have only marginally succeeded. The moped on the Home Page is not connected to any text, except for the vague assumption that this is one of

their products. The links to the different language versions, with the country flag and corresponding language below it, is an effective use of graphics and text, as it helps the reader to understand more easily where the link would take them. However, the navigational graphics and text are not aligned under each other and make it a bit confusing. They have put the text on the graphics, which helps maintain consistency and unity, but the text is in different font sizes, and they divide some long words but not others. Also, the banner for the News page is the only one to use both the Spanish and the English translation.

The Mondial site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 269 out of a possible 390 points. This puts the site at overall score of 7. It can advance to the next level by working more on color and movement and on making the navigation more available. It also falls very close to the average and median scores for all sites: average of 270.68 and median of 267.5.

Moto Roma (Argentina)

The Moto Roma site is available at http://www.motoroma.com.ar. The site is one of the lowest scoring of the entire group. The scores for Moto Roma are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	6	6	6	6	6	0
Site Purpose	7	7	8	8	8	-0.5
Consistent Theme	2	2	1	1	1	0.5
Consistent Site	1	2	2	2	2	-0.25
Page Titles	10	10	10	10	10	0
Space Well Used	7	6	7	7	7	-0.25
Avail of Navigation	9	9	10	10	10	-0.5
Languages	2	2	2	2	2	0
Languages Separate	1	1	1	1	1	0
TOTAL	45	45	47	47	47	-1

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	6	6	6	6	6	0
Search or Index	5	5	5	5	6	-1
Simple Background	2	2	2	2	2	0
Important First	7	7	8	7	7	0.25
Headings Used	8	8	8	8	7	1
Chunking	9	9	8	9	9	-0.25
Horizontal Rules	6	6	7	6	6	0.25
TOTAL	43	43	44	43	43	0.25

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	8	9	10	10	10	-0.75
Default New Move	5	5	8	5	5	0.75
Repeated Banner	1	1	2	1	1	0.25
Repeated Logo	1	1	1	1	1	0
Repeated Icons	6	6	4	6	6	-0.5
Repeated Nav Devices	10	10	10	10	9	1
Graphic Color Theme	3	4	1	1	2	0.25
TOTAL	34	36	36	34	34	1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	6	8	8	-0.5
Consistent Use	4	4	4	4	4	0
Color Used	6	6	8	6	6	0.5
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	3	3	3	3	3	0
Color and Movement	5	5	4	4	4	0.5
TOTAL	46	46	45	45	45	0.5

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	2	4	3	3	2	1
Graphical Nav	2	2	2	2	2	0
Text Flow	9	9	7	7	7	1
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	10	10	8	8	8	1
Ratio G:T Main Page	4	4	6	6	6	-1
Use of Text and	4	4	6	4	5	-0.5
Links Explained	7	6	3	6	6	-0.5
Interactive Elements	5	3	4	5	5	-0.75
TOTAL	53	52	49	51	51	0.25

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	221	222	221	220	220	1

The site has useful page titles even though those titles do not show up on the title bar because it is a framed site. However, because it is framed, the navigation is always readily available. The designers even include the same links at the bottom of each page. This double coverage may be too much, but users should not have any problems with knowing where to go next. The designers also deliberately place the graphics on each page by using sizing and alt elements.

They need to improve in the use of color specifically, as this is one of the few Mexican sites that scored generally poorly for this principle. The design needs to use a single simple background instead of many textured and layered ones. This will also improve the score it received for not having a consistent

theme throughout the site. Next, the design needs more small multiples in the form of repeated banners and logos. It is currently very difficult to tell if there is a corporate logo and what that might be. The only clue is the "Nuestra Historia" page with a picture of the storefront. Finally, the site needs to include culture specific versions, especially English, to reach out to the international audience.

The Moto Roma site designers do an average job at making a usable site. The site scored a total of 220 out of a possible 390 points. This puts the site at an overall score of 6.

Performance

The Performance site is available at http://viernes.iwm.com.mx/servicios/pemexico/. This site is in the bottom five of all the sites. It scored below average in most cases, and only occasionally scored higher than an 8. The scores for Performance are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	4
Site Purpose	7
Consistent Theme	8
Consistent Site	7
Page Titles	8
Space Well Used	8
Avail of Navigation	1
Languages	2
Languages Separate	1
TOTAL	46

Text and Graphics	Score
Combined?	4
Graphical Nav	1
Text Flow	10
Deliberate Placement	9
Ratio Graphics: Text	6
Ratio G:T Main Page	6
Use of Text and	4
Links Explained	3
Interactive Elements	2
TOTAL	45

Layer and Separation	Score
Site Map	1
Search or Index	1
Simple Background	7
Important First	8
Headings Used	3
Chunking	5
Horizontal Rules	7
TOTAL	32

Color	Score
Avg. # of Colors	6
Consistent Use	6
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	4
TOTAL	46

Small Multiples	Score
User Controls	1
Default New Move	1
Repeated Banner	10
Repeated Logo	10
Repeated Icons	1
Repeated Nav Devices	1
Graphic Color Theme	9
TOTAL	33

The site scores well with having a repeating the corporate logo and page banners, especially since the site consists of only one page. However, the text flow around graphic is done quite well, despite the amateurish design, to the effect that the graphic becomes part of the surrounding text. They need to improve in many areas, but especially in micro/macro design, layering and separation (tied for the lowest score), and integration of text and graphics (second lowest score). High impact areas are the following: rethinking navigation availability (since there is no navigation, this would also include chunking information to include on separate pages), and repeating icons and navigational devices. In general, the site is just too text-heavy and can use more graphics to draw the reader in.

The Performance site designers do an adequate job at making a site that follows Tufte's principles. The site scored a total of 202 out of a possible 390 points. This puts the site at overall score of 6. It is at the bottom range of the 6s, and so needs some drastic reworking to even approach the next level. But, it is possible for the designers to achieve this higher score.

Piso (Venezuela)

The Piso site is http://www.serv3p.com/es/polifilm/piso-auto/piso-automotriz.htm. The Piso site is the best out of all the Mexican sites. It makes consistently excellent use of Tufte's design principles and is more suited to a multicultural audience than the other sites. The scores for Piso are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	10	0
Site Purpose	10	10	10	10	10	0
Consistent Theme	10	10	9	10	10	-0.25
Consistent Site	9	9	8	9	9	-0.25
Page Titles	8	8	9	8	8	0.25
Space Well Used	10	10	10	10	10	0
Avail of Navigation	10	10	10	10	10	0
Languages	4	4	4	4	4	0
Languages Separate	7	8	8	8	8	-0.25
TOTAL	78	79	78	79	79	-0.5

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	9	9	9	9	9	0
Search or Index	9	9	9	9	9	0
Simple Background	5	6	7	7	7	-0.75
Important First	8	9	10	10	10	-0.75
Headings Used	6	7	8	6	6	0.75
Chunking	9	8	9	10	10	-1
Horizontal Rules	8	9	7	7	7	0.75
TOTAL	54	57	59	58	58	-1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	9	9	8	9	9	-0.25
Default New Move	5	5	5	5	5	0
Repeated Banner	9	9	10	10	9	0.5
Repeated Logo	10	10	10	10	10	0
Repeated Icons	9	9	9	9	9	0
Repeated Nav Devices	9	9	9	9	9	0
Graphic Color Theme	10	10	10	9	9	0.75
TOTAL	61	61	61	61	60	1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	8	8	8	0
Consistent Use	6	6	7	6	6	0.25
Color Used	6	8	8	8	8	-0.5
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	6	6	6	7	7	-0.75
Color and Movement	4	4	4	4	4	0
TOTAL	50	52	53	53	53	-1

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	9	10	8	9	9	0
Graphical Nav	5	5	6	5	5	0.25
Text Flow	10	9	7	10	10	-1
Deliberate Placement	9	9	9	9	9	0
Ratio Graphics: Text	8	10	10	10	10	-0.5
Ratio G:T Main Page	4	4	6	4	4	0.5
Use of Text and	10	8	8	8	8	0.5
Links Explained	6	8	5	6	6	0.25
Interactive Elements	5	5	3	3	3	1
TOTAL	66	68	62	64	64	1

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	309	317	313	315	314	-0.5

The site designers seem to have placed great emphasis on micro/macro design. The main page is only one screen long, so it is easy to make a decision based on all viewable choices. This is one of the only sites to explicitly state the site purpose (in the Satisfaccion al Cliente page). Navigation is always readily available on the left side of the screen, and although the default next move is ruined a bit by the removal of links corresponding to the current page, it is quite easy to get from one area to another. The first two or three levels of the site are mainly dedicated to navigation and chunking so that readers can quickly get to exactly the information they need without having to wade through a lot of extra data points. And

interaction-wise, the inclusion of the company video is a nice touch to give more visual and auditory cues to the viewers.

The site's lowest score is a 3 for a lack of interactive elements, since the only interactions are links and an email link. This is also reflected in the low score for color and movement. Also in need of redesign are the following: adding more languages and using fewer graphics on the main page. Most of the other categories have a fairly high score and so require only minor adjustments to get a perfect score.

The Piso site designers do a superb job at making a site that follows Tufte's principles. The site scored a total of 314 out of a possible 390 points. This puts the site at the overall score of 8. It is very close to a 9. A couple minor changes would help push it up to a low 9 very easily.

Proeza

The Proeza site is available at http://www.ina.com.mx/expo/metalsa/index.html. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better Mexican sites, although definitely not one of the top 10 sites in the group.

The scores for Proeza are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	8
Consistent Site	8
Page Titles	5
Space Well Used	7
Avail of Navigation	4
Languages	4
Languages Separate	8
TOTAL	60

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	4
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	6
Links Explained	7
Interactive Elements	1
TOTAL	53

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	10
Important First	7
Headings Used	4
Chunking	9
Horizontal Rules	10
TOTAL	58

Small Multiples	Score
User Controls	7
Default New Move	5
Repeated Banner	1
Repeated Logo	2
Repeated Icons	6
Repeated Nav Devices	4
Graphic Color Theme	6
TOTAL	31

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	51

A simple background is the hallmark of this site. This background actually uses a relief version of the corporate logo to help brand the site. This is done in a way that makes the relief very light so that it does not distract from the data. The designers have also limited the number of colors to about 8 so that they can use them more consistently. While the colors are not always used consistently, this is a step in the right direction. The average ratio of graphics to text is done very well too so that they complement and aid in data gathering. For example, the Tanques page shows pictures of two different kinds of Tanks with information about each one.

They need to improve in the same two areas as most of the other Mexican sites: adding more interactivity to the site, and supplying more color and movement to enliven the page design. Lastly, the designers need to more explicitly repeat the corporate logo. They can still use the background, but the dark form of the logo needs to appear in the same location on every page (like the upper left corner). The same holds true for the page banners: they need to be used and repeated so that the design is similar.

The Proeza site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 253 out of a possible 390 points. This puts the site at the overall score of 7. It also falls very close to the median score for all Mexican sites, 253. This shows that it is indeed quite average.

Ramirez

The Ramirez site is available at http://www.cintermex.org.mx/hotpages/gruporamirezi/. It is a small site that tries to act as a kind of brochure, with a few Internet interactions added in. However, these are all disjointed and haphazard.

The scores for Ramirez are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	3
Site Purpose	7
Consistent Theme	10
Consistent Site	8
Page Titles	8
Space Well Used	8
Avail of Navigation	1
Languages	2
Languages Separate	1
TOTAL	48

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	6
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	5
Links Explained	1
Interactive Elements	1
TOTAL	54

Layer and Separation	Score
Site Map	1
Search or Index	1
Simple Background	10
Important First	8
Headings Used	2
Chunking	3
Horizontal Rules	7
TOTAL	32

Color	Score
Avg. # of Colors	8
Consistent Use	4
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	47

Small Multiples	Score
User Controls	2
Default New Move	1
Repeated Banner	2
Repeated Logo	1
Repeated Icons	2
Repeated Nav Devices	1
Graphic Color Theme	9
TOTAL	18

The site designers keep the theme consistent across the few pages of the site and use a simple white background that contrasts well with the black text. The designers are also expert at using just enough graphics to balance the pages. They need to improve in most of the design areas though, especially in small multiple design as it only received a combined score of 18 for this principle. This could be easily changed, however, by using repetition more for icons, logos and navigation devices. This would add to the navigation availability and default next move categories, as well as the link explanation category, so that these would significantly raise the site's total score with little effort. The other areas for improvement, like more interaction, movement, and a site map, can be fixed with a little design work and planning.

The Ramirez site designers do poor job at making a useful site. The site scored a total of 199 out of a possible 390 points. This puts the site at the overall score of 5, although two points would push it up to a 6. As mentioned previously, the few simple fixes for repetition would take the site way past that low 6.

Rassini

The Rassini site is available at http://www.ina.com.mx/expo/rassini. The site has an average design that makes average use of the design principles discussed in this thesis.

The scores for Rassini are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	10
Consistent Site	8
Page Titles	8
Space Well Used	8
Avail of Navigation	3
Languages	4
Languages Separate	8
TOTAL	68

Text and Graphics	Score
Combined?	2
Graphical Nav	3
Text Flow	9
Deliberate Placement	7
Ratio Graphics: Text	8
Ratio G:T Main Page	8
Use of Text and	7
Links Explained	7
Interactive Elements	5
TOTAL	56

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	7
Headings Used	8
Chunking	9
Horizontal Rules	7
TOTAL	53

Color	Score
Avg. # of Colors	10
Consistent Use	5
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	50

Small Multiples	Score
User Controls	7
Default New Move	4
Repeated Banner	3
Repeated Logo	1
Repeated Icons	2
Repeated Nav Devices	7
Graphic Color Theme	6
TOTAL	30

Micro/macro design is the particular strength of this design, and it even received the second highest total score in this principle for all Mexican sites. They accomplished this by keeping the main page to a little over one screen long, having a consistent theme running throughout the site, and having above

average scores in the other categories. The design also uses a simple white background to avoid any data noise confusion, and keeps the numbers of colors to a minimum so that they can be used to greater effect. Although the designers use alternating green and blue for text, they are at least consistent in this usage and do not change the pattern.

They need to improve in small multiple design the most. As with the other sites that have problems with this principle, it can easily be remedied by repeating key items like the corporate logo and icons. This site needs to repeat these two items on every page instead of just keeping everything on the main page. The site also needs more movement and associated colors.

The Rassini site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 257 out of a possible 390 points. This puts the site at the overall score of 7. It also falls very close to the median score for all Mexican sites, 253. This shows that it is indeed quite average.

Tecate

The Tecate site is available at http://tecatewheels.simplenet.com. The site design scored at the average level in each of the five principles, showing that the designers are generally good, but not skilled in any one area.

The scores for Tecate are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	7
Consistent Theme	10
Consistent Site	6
Page Titles	2
Space Well Used	7
Avail of Navigation	10
Languages	4
Languages Separate	8
TOTAL	63

Text and Graphics	Score
Combined?	3
Graphical Nav	2
Text Flow	6
Deliberate Placement	4
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	6
Interactive Elements	5
TOTAL	54

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	10
Important First	9
Headings Used	6
Chunking	3
Horizontal Rules	7
TOTAL	45

Small Multiples	Score
User Controls	6
Default New Move	6
Repeated Banner	1
Repeated Logo	10
Repeated Icons	1
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	43

Color	Score
Avg. # of Colors	6
Consistent Use	9
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	48

The site's simple black and white theme is consistent across the site, and the simple white background contrasts well with the text and graphics. The designers also did well to keep the navigation in the same location. The only confusing thing is that the Products link only goes to an English version of the site, no matter if the user has clicked the Spanish link or not. The design uses repetition of the corporate logo and navigation to tie the site together. Interestingly enough, the designers did not repeat the banner or icons. They also need to improve the page titles to be more descriptive than just "Tecate Wheels". And, of course, the design does not have any movement to enliven the pages.

The Tecate site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 253 out of a possible 390 points. This puts the site at the overall score of 7. It also falls very close to the median score for all Mexican sites, 253. This shows that it is indeed quite average.

Tepeyac

The Tepeyac site is available at http://www.ina.com.mx/expo/tepeyac/. The site does quite well with many of the categories, especially those that are part of the micro/macro design principle. The site received average scores in the other categories, with only a couple low scores in small multiples.

The scores for Tepeyac are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	10
Consistent Site	8
Page Titles	4
Space Well Used	8
Avail of Navigation	6
Languages	4
Languages Separate	8
TOTAL	67

Text and Graphics	Score
Combined?	4
Graphical Nav	5
Text Flow	10
Deliberate Placement	5
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	7
Links Explained	3
Interactive Elements	3
TOTAL	53

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	7
Important First	9
Headings Used	7
Chunking	9
Horizontal Rules	9
TOTAL	55

Color	Score
Avg. # of Colors	10
Consistent Use	4
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	4
TOTAL	50

Small Multiples	Score
User Controls	6
Default New Move	6
Repeated Banner	2
Repeated Logo	5
Repeated Icons	2
Repeated Nav Devices	5
Graphic Color Theme	6
TOTAL	32

The site designers do especially well with using only a small number of colors in the site and maintaining a good ratio of graphics and text. The designers are able to flow the text around the graphics so that they interact appropriately. For example, the "Quienes Somos" section has two areas where the text in that area is closely tied to the graphic and nothing else. This helps to better define the consistent site theme in a way that is not overpowering for the user. They need to improve the pages by using better repetition of banners and icons so that the theme and flow of the site is smoother.

The Tepeyac site designers do good job with many of Tufte's design principles, although by no means excellent. The site scored a total of 257 out of a possible 390 points. This puts the site at overall score of 7. This puts it very close to the median score for all Mexican sites, 253. This shows that it is also quite average.

Tomco

The Tomco site is available at http://www.tomco.com.mx. Tomco is another very average site that scores in the middle for a most of the categories of the principles.

The scores for Tomco are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	7
Consistent Theme	9
Consistent Site	6
Page Titles	5
Space Well Used	8
Avail of Navigation	2
Languages	2
Languages Separate	1
TOTAL	46

Text and Graphics	Score
Combined?	6
Graphical Nav	5
Text Flow	10
Deliberate Placement	6
Ratio Graphics: Text	4
Ratio G:T Main Page	10
Use of Text and	5
Links Explained	3
Interactive Elements	4
TOTAL	53

Layer and Separation	Score
Site Map	8
Search or Index	4
Simple Background	7
Important First	5
Headings Used	8
Chunking	7
Horizontal Rules	5
TOTAL	44

Color	Score
Avg. # of Colors	6
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	5
Color and Movement	4
TOTAL	50

Small Multiples	Score
User Controls	4
Default New Move	3
Repeated Banner	2
Repeated Logo	2
Repeated Icons	4
Repeated Nav Devices	4
Graphic Color Theme	6
TOTAL	25

The site designers specialize in keeping the flow of text around graphics in perfect form. This is easily seen on the “Valvula de Recirculacion de Gases” page, where the figure numbers are closely tied with the graphic part. The ratio of graphics on the main page is also expertly done so that the page has enough to maintain interest but not so much as to overshadow the text. Lastly, the designers have stuck to a single theme and consistent use of color throughout much of the site.

They need to improve the site by adding at least an English version and working on using repeating banners and logos. The navigation for the site is also less than ideal. Users must scroll down to the bottom of each page, and the links are just for back and forward, with no indication of where they take the user. The only effective navigation is to use the “Menu” link and go back to the main page to choose again. This problem also has direct bearing on the efficacy of the default new move design. So, while the

back and next buttons do indicate the next move, they are relatively useless in this context because the user cannot tell where the link will lead them.

The Tomco site designers scored around 5 in most every category, and, as a result, have developed a site that needs to be completely reworked to obtain any user value. The site scored a total of 218 out of a possible 390 points. This puts the site at an overall score of 6. It will take a lot of rework to get the site up to the next level. A few of the easiest changes have already been alluded to. The rest will take design and planning.

Trebol

The Trebol site is available at http://www.gitrebol.com.mx. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better sites, maybe even one of the top 10 sites in the group.

The scores for Trebol are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	4
Site Purpose	9
Consistent Theme	6
Consistent Site	9
Page Titles	8
Space Well Used	4
Avail of Navigation	2
Languages	4
Languages Separate	3
TOTAL	49

Text and Graphics	Score
Combined?	7
Graphical Nav	6
Text Flow	6
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	8
Links Explained	7
Interactive Elements	8
TOTAL	63

Layer and Separation	Score
Site Map	4
Search or Index	4
Simple Background	9
Important First	5
Headings Used	4
Chunking	6
Horizontal Rules	7
TOTAL	39

Small Multiples	Score
User Controls	5
Default New Move	7
Repeated Banner	8
Repeated Logo	9
Repeated Icons	8
Repeated Nav Devices	2
Graphic Color Theme	9
TOTAL	48

Color	Score
Avg. # of Colors	10
Consistent Use	9
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	9
Color and Movement	4
TOTAL	58

The site designers keep the ratio of graphics and text on the site at a happy medium. They have also found a happy medium of 6 colors that they use consistently: black for text, green for logo and banners, gray for background, blue for links and buttons, red for email icon and some headings, and purple for visited links. The site scored above average in many other areas as well, to help make this one of the better sites.

They need to improve the navigation since the user cannot see all the choices at once on the secondary pages, like “Nuestros Productos”, let alone all the buttons on the main page. It would be ideal to tighten up this main navigation so that it could be repeated across all the pages, with section specific navigation added to allow the reader to delve deeper into the site if necessary. Finally, it is great that the site offers Spanish and English translations of each page, but this gets easily confusing unless they are side by side. A good example is the “Nuestro Grupo” page, where each paragraph has a language counterpart exactly opposite. On the other hand, most of the pages are like the “Plantas de Oxidos” page where first one version then the other is presented. The similar headings confuse the reader, especially those who are trying to skim for information.

The Trebol site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 257 out of a possible 390 points. This puts the site at an overall score of 7. This puts the site slightly above the median score for all Mexican sites, 253. This shows that it is indeed slightly better than the average site.

Vitro

The Vitro site is available at http://www.vto.com/vto98/espanol/frame0.htm. This site is the one that all other Mexican site designers need to model their sites after. Although it is not a perfect site, it uses most of Tufte’s principles in great ways that make the site much more usable and friendly for users.

The scores for Vitro are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	4
Site Purpose	7
Consistent Theme	8
Consistent Site	9
Page Titles	5
Space Well Used	4
Avail of Navigation	10
Languages	4
Languages Separate	10
TOTAL	61

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	10
Deliberate Placement	4
Ratio Graphics: Text	6
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	7
Interactive Elements	10
TOTAL	70

Layer and Separation	Score
Site Map	10
Search or Index	5
Simple Background	9
Important First	8
Headings Used	9
Chunking	9
Horizontal Rules	8
TOTAL	58

Color	Score
Avg. # of Colors	2
Consistent Use	10
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	58

Small Multiples	Score
User Controls	10
Default New Move	7
Repeated Banner	10
Repeated Logo	10
Repeated Icons	10
Repeated Nav Devices	10
Graphic Color Theme	8
TOTAL	65

This site scores well in just about everything. Especially impressive are the small multiple and integration of text and graphics principles. This site received some of the highest scores in these two principles of all the sites reviewed in this thesis. Thus, not only should Mexican designers learn from this site, designers around the world should take a lesson or two by studying it. Another set of points that Mexican designers need to emulate is how this site uses color and movement and how they have added more user interaction points. For example, the “Contact Us” light blinks occasionally, a light travels across the navigation banner, and the main page uses an imagemap navigation scheme to enliven the design.

The easiest ways to improve the site quickly are to break up the main page into smaller pages so that the user does not have to scroll immediately. Also, the designers need to limit the colors more so that color is more meaningful when used for emphasis.

The Vitro site designers do an amazing job at making a site that follows Tufte's principles. The site scored a total of 312 out of a possible 390 points. This puts the site at overall score of 8. To get to the 9, the site only needs to make a few minor adjustments.

Mexican Sites Scores

This section provides tables of the scores for all the Mexican sites so that you can compare the scores for the sites in one location to identify patterns and more easily make categorizations.

Table 42. Mexican sites Micro/Macro scores

Micro/Macro

Web Site	Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate
Ahmsa	9	7	9	9	5	8	8	4	4
Alfa Nemak	9	1	10	6	7	7	7	4	8
Aral Mex	8	1	10	6	5	8	4	4	8
Arbo Mex	6	1	8	6	4	4	2	4	8
Baleromex	6	1	10	8	2	5	1	2	1
Clemex	8	1	5	6	3	7	2	4	8
Dirona	9	9	7	7	5	5	5	4	8
Enermex	7	1	10	5	4	7	7	4	8
Ferrocarril	9	7	8	8	7	7	6	2	1
Filtros Mann	9	8	10	8	7	8	3	2	8
Hylsamex	10	7	9	9	9	8	5	4	8
Intehc	4	9	10	8	8	4	3	4	1
Mondial	3	7	7	8	10	4	2	6	8
Moto Roma	6	8	1	2	10	7	10	2	1
Performance	4	7	8	7	8	8	1	2	1
Piso	10	10	10	9	8	10	10	4	8
Proeza	9	7	8	8	5	7	4	4	8
Ramirez	3	7	10	8	8	8	1	2	1
Rassini	10	9	10	8	8	8	3	4	8
Tecate	9	7	10	6	2	7	10	4	8
Tepeyac	10	9	10	8	4	8	6	4	8
Tomco	6	7	9	6	5	8	2	2	1
Trebol	4	9	6	9	8	4	2	4	3
Vitro	4	7	8	9	5	4	10	4	10

Table 43. Mexican sites Layering and Separation scores

Layering and Separation

Web Site	Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules
Ahmsa	7	7	10	6	8	9	7
Alfa Nemak	7	7	10	6	4	4	9
Aral Mex	8	8	7	9	4	4	7
Arbo Mex	5	5	10	2	4	7	8
Baleromex	1	1	10	5	3	6	2
Clemex	6	6	7	9	4	9	3
Dirona	8	8	5	5	8	6	9
Enermex	1	1	8	9	8	9	5
Ferrocarril	8	5	7	9	6	9	5
Filtros Mann	7	7	7	7	8	9	5
Hylsamex	7	9	9	9	9	10	7
Intehc	7	7	7	8	4	4	7
Mondial	6	6	10	5	7	4	7
Moto Roma	6	6	2	7	7	9	6
Performance	1	1	7	8	3	5	7
Piso	9	9	7	10	6	10	7
Proeza	9	9	10	7	4	9	10
Ramirez	1	1	10	8	2	3	7
Rassini	6	6	10	7	8	9	7
Tecate	5	5	10	9	6	3	7
Tepeyac	7	7	7	9	7	9	9
Tomco	8	4	7	5	8	7	5
Trebol	4	4	9	5	4	6	7
Vitro	10	5	9	8	9	9	8

Table 44. Mexican sites Small Multiples scores

Small Multiples

Web Site	User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme
Ahmsa	9	8	7	9	8	9	10
Alfa Nemak	6	8	3	2	9	9	10
Aral Mex	6	8	2	9	9	9	8
Arbo Mex	4	10	2	6	4	7	10
Baleromex	1	10	2	2	1	1	10
Clemex	4	5	2	2	1	2	6
Dirona	6	7	2	4	2	8	7
Enermex	6	4	4	9	10	9	8
Ferrocarril	6	6	7	7	6	2	4
Filtros Mann	7	6	1	2	1	9	9
Hylsamex	10	5	9	9	8	8	8
Intehc	4	4	4	2	6	6	8
Mondial	6	6	4	9	10	9	7
Moto Roma	10	5	1	1	6	9	2
Performance	1	1	10	10	1	1	9
Piso	9	5	9	10	9	9	9
Proeza	7	5	1	2	6	4	6
Ramirez	2	1	2	1	2	1	9
Rassini	7	4	3	1	2	7	6
Tecate	6	6	1	10	1	10	9
Tepeyac	6	6	2	5	2	5	6
Tomco	4	3	2	2	4	4	6
Trebol	5	7	8	9	8	2	9
Vitro	10	7	10	10	10	10	8

Table 45. Mexican sites Color scores

Color

Web Site	Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Background Color	Color Scheme	Text Contrast w/Background	Color & Movement
Ahmsa	8	9	8	10	10	6	1
Alfa Nemak	10	6	6	10	10	9	1
Aral Mex	8	4	8	10	10	5	1
Arbo Mex	10	4	8	10	10	10	10
Baleromex	10	10	6	10	10	8	8
Clemex	10	6	10	10	10	7	1
Dirona	10	4	6	10	10	6	1
Enermex	10	6	6	10	10	10	1
Ferrocarril	4	6	8	10	10	6	8
Filtros Mann	6	6	6	10	10	6	1
Hylsamex	8	8	8	10	10	8	4
Intehc	8	8	6	10	10	8	8
Mondial	4	5	8	10	10	8	1
Moto Roma	8	4	6	10	10	3	4
Performance	6	6	4	10	10	6	4
Piso	8	6	8	10	10	7	4
Proeza	10	6	6	10	10	8	1
Ramirez	8	4	6	10	10	8	1
Rassini	10	5	6	10	10	8	1
Tecate	6	9	4	10	10	8	1
Tepeyac	10	4	6	10	10	6	4
Tomco	6	9	6	10	10	5	4
Trebol	10	9	6	10	10	9	4
Vitro	2	10	10	10	10	8	8

Table 46. Mexican sites Integration of Text and Graphics scores

Integration of Text and Graphics

Web Site	Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements
Ahmsa	10	7	10	5	10	6	8	6	4
Alfa Nemak	10	6	9	5	10	10	8	6	3
Aral Mex	3	2	9	5	10	10	7	6	3
Arbo Mex	3	8	8	10	10	4	7	7	7
Baleromex	4	1	6	5	10	10	6	6	7
Clemex	3	2	6	4	8	10	6	6	3
Dirona	3	3	9	5	10	6	9	6	4
Enermex	7	7	4	5	8	6	5	3	3
Ferrocarril	6	3	6	8	8	4	6	6	5
Filtros Mann	3	2	7	7	8	6	5	3	2
Hylsamex	8	7	10	4	10	4	9	8	9
Intehc	8	5	9	7	8	8	8	3	5
Mondial	10	7	7	10	10	10	8	7	3
Moto Roma	2	2	7	10	8	6	5	6	5
Performance	4	1	10	9	6	6	4	3	2
Piso	9	5	10	9	10	4	8	6	3
Proeza	9	5	4	7	10	4	6	7	1
Ramirez	9	5	6	7	10	10	5	1	1
Rassini	2	3	9	7	8	8	7	7	5
Tecate	3	2	6	4	10	10	8	6	5
Tepeyac	4	5	10	5	10	6	7	3	3
Tomco	6	5	10	6	4	10	5	3	4
Trebol	7	6	6	7	10	4	8	7	8
Vitro	8	7	10	4	6	10	8	7	10

Table 47. Mexican sites total scores

Site	Total 1	Total 2	Total 3	Total 4	Total 5	Grand Total	Overall Score
Ahmsa	63	54	60	52	66	295	8
Alfa Nemak	59	47	47	52	67	272	7
Aral Mex	54	47	51	46	55	253	7
Arbo Mex	43	41	43	62	64	253	7
Baleromex	36	28	27	62	55	208	6
Clemex	44	44	22	54	48	212	6
Dirona	59	49	36	47	55	246	7
Enermex	53	41	50	53	48	245	7
Ferrocarril	55	49	38	52	52	246	7
Filtros Mann	63	50	35	45	43	236	6
Hylsamex	69	60	57	56	69	311	8
Intehc	51	44	34	58	61	248	7
Mondial	55	45	51	46	72	269	7
Moto Roma	47	43	34	45	51	220	6
Performance	46	32	33	46	45	202	6
Piso	79	58	60	53	64	314	8
Proeza	60	58	31	51	53	253	7
Ramirez	48	32	18	47	54	199	5
Rassini	68	53	30	50	56	257	7
Tecate	63	45	43	48	54	253	7
Tepeyac	67	55	32	50	53	257	7
Tomco	46	44	25	50	53	218	6
Trebol	49	39	48	58	63	257	7
Vitro	61	58	65	58	70	312	8

Korean Sites Microscopic Analyses

I selected 24 Korean automobile dealers and manufacturer web sites for this study. I tried to select popular sites as well as those that were not well known so as to get a better sampling of the range of sites and designs out there. The sites discussed in this section that have multiple raters are Hyundai, Kia, Kumho Chemicals, and SsangYong.

A-ju

The A-ju site is available at http://www.kita.or.kr/Kyongnam/com2_e.html. The site has a nice design interface that makes good use of some of Tufte's principles.

The scores for A-ju are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	6
Consistent Theme	9
Consistent Site	8
Page Titles	8
Space Well Used	8
Avail of Navigation	10
Languages	4
Languages Separate	8
TOTAL	70

Text and Graphics	Score
Combined?	8
Graphical Nav	4
Text Flow	10
Deliberate Placement	4
Ratio Graphics: Text	4
Ratio G:T Main Page	4
Use of Text and	5
Links Explained	6
Interactive Elements	7
TOTAL	52

Layer and Separation	Score
Site Map	6
Search or Index	10
Simple Background	10
Important First	7
Headings Used	8
Chunking	7
Horizontal Rules	5
TOTAL	53

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	53

Small Multiples	Score
User Controls	6
Default New Move	5
Repeated Banner	7
Repeated Logo	1
Repeated Icons	8
Repeated Nav Devices	9
Graphic Color Theme	6
TOTAL	42

The site design scores for this site are best across the micro/macro design principles. The site scored in the top five for this principle. Especially impressive is the navigation availability from every page. It is very easy to move into and between secondary sections because the navigation is located at the top of every page. The site even provides a search function to help users get the information they need quickly, rather than having to click and guess at links. As with most of the Korean sites reviewed here, this site uses a simple white background for a high level of contrast with the textual data and to have an uncluttered look for the site. Finally, the design has an excellent flow about it, as the text and graphics are all spaced well around each other to aid visibility and to tie the page together. This is especially evident on the main page, where the text is tied to a specific, obvious button.

They need to improve the site in a couple ways. First, the site needs to add in the corporate logo and then repeat it on every page so it is obvious what company is responsible for the site. This also aids branding. Second, the site needs to take advantage of Internet technology and incorporate movement and color judiciously into the site so as to attract the reader's attention to key data.

The A-ju site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 270 out of a possible 390 points. This puts the site at the overall score of 7. It is fairly close to a score of 8, which it could easily achieve by working on the two categories previously mentioned. It falls slightly below the median and average scores for all Korean sites, 286.5 and 284.17 respectively. This shows that a nice design alone is not significant enough to have a useful web site. It does fall precisely at the combined average of 270.68 and 267.5 median).

AutoKorea

The AutoKorea site is at http://commerce.ktnet.co.kr/Companies/autokorea/. The site has the poorest scores out of all the Korean sites. However, the site itself is fairly consistent in its own design.

The scores for AutoKorea are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	5
Site Purpose	10
Consistent Theme	8
Consistent Site	9
Page Titles	8
Space Well Used	5
Avail of Navigation	1
Languages	2
Languages Separate	1
TOTAL	49

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	10
Deliberate Placement	6
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	6
Interactive Elements	2
TOTAL	68

Layer and Separation	Score
Site Map	1
Search or Index	1
Simple Background	10
Important First	5
Headings Used	3
Chunking	3
Horizontal Rules	7
TOTAL	30

Small Multiples	Score
User Controls	2
Default New Move	1
Repeated Banner	2
Repeated Logo	2
Repeated Icons	2
Repeated Nav Devices	2
Graphic Color Theme	6
TOTAL	17

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	49

The site designers have explicitly stated the site purpose up front and then use that purpose as a measuring stick when creating the design. The designers acknowledge that the purpose is to deliver good quality products at a competitive price. Therefore, they show the products up front and provide purchasing information. The designers also chose to use a nice, simple background to keep the site uncluttered. Next, the designers were able to work with the arrangement of text and graphics in a way that the text flows around the graphics with very nice spacing. Last, the designers have used a good ratio of graphics to the amount of text that they use for the site so that the site is well balanced.

They need to improve in many areas. The site received the lowest score of all Korean sites for the principle of small multiples and the second lowest for color and for layering and separation. The site also scored in the bottom five for micro/macro design. First, the site needs a better navigation system that is easier to access than just at the bottom of the page or within textual descriptions. Second, The site needs to work on developing sites that take advantage of cultural variations. As part of this, they need to work on the English version so that the language is more professional and appropriate. Third, the site needs to have a search function or an index. At the minimum, a site map can aid users in navigating better. Next, the site does not take advantage of any repetition to help guide and inform the reader. Finally, the designers need to do more with movement and color to make the site come alive for the users.

The AutoKorea site designers need to do a lot of work to redesign a site that follows Tufte's principles. The site scored a total of 213 out of a possible 390 points. This puts the site at the overall score of 6. It gets the 6 because of its strong tie between purpose and design.

Daejin

The Daejin site is available at http://kosp.co.kr. The site has a nice design that is above average in all aspects. That consistency helps to make it one of the better sites, ranked about 10th overall for all Korean sites. The scores for Daejin are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	7
Consistent Site	7
Page Titles	5
Space Well Used	7
Avail of Navigation	10
Languages	6
Languages Separate	8
TOTAL	69

Text and Graphics	Score
Combined?	6
Graphical Nav	5
Text Flow	9
Deliberate Placement	6
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	8
Links Explained	8
Interactive Elements	8
TOTAL	66

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	8
Important First	10
Headings Used	7
Chunking	7
Horizontal Rules	8
TOTAL	54

Color	Score
Avg. # of Colors	6
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	10
Color and Movement	8
TOTAL	58

Small Multiples	Score
User Controls	6
Default New Move	9
Repeated Banner	9
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	62

Small multiple design provides the best scores for this site, especially with the repetition of the corporate logo throughout the site. The designers put important information first in the site. For example, all tertiary pages have links at the top of the page that take the user to specific portions of the page. This is helpful because these pages are full of data and quite long. Additionally, the average ratio of graphics to text throughout the site is kept at a decent 60% so that it is not too overloaded, but enough to handle navigation and to break up the long screens of textual data.

The site only received two scores lower than a six: page titles and graphical navigation buttons. The titles were average, but did not provide any additional information to help guide users through the site. The design could have also used graphical navigation in more places than just the main navigation bar. It would have been useful to have graphics involved with the links at the tops of tertiary pages, for example.

The Daejin site designers made a site that is usable by a fairly broad audience. The site scored a total of 309 out of a possible 390 points. This puts the site at the overall score of 8. While this is not fantastic, considering the above average scores that the site received in all categories, it does show that the site is not perfect and that it has some room to improve before it is an exceptional site.

Daelim

The Daelim site is available at http://www.daelim.co.kr:80/index.html. Although this site had a couple scores lower than Daejin, the site had more higher scores, and so it is rated as one of the best sites in the group. The scores for Daelim are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	8
Consistent Theme	9
Consistent Site	8
Page Titles	5
Space Well Used	7
Avail of Navigation	10
Languages	4
Languages Separate	9
TOTAL	70

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	10
Deliberate Placement	8
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	8
Interactive Elements	7
TOTAL	75

Layer and Separation	Score
Site Map	8
Search or Index	8
Simple Background	10
Important First	9
Headings Used	7
Chunking	6
Horizontal Rules	8
TOTAL	56

Small Multiples	Score
User Controls	10
Default New Move	8
Repeated Banner	9
Repeated Logo	10
Repeated Icons	8
Repeated Nav Devices	8
Graphic Color Theme	8
TOTAL	61

Color	Score
Avg. # of Colors	10
Consistent Use	8
Color Used	10
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	4
TOTAL	60

The site designers excel in micro/macro design and with integration of text and graphics specifically. The first page is a splash page (not viewable on the CD-ROM, but a printout has been provided in the appendix), and is kept short and to the point: letting users determine what language version they want to view. The navigation is always available and easily understood. Additionally, the navigation scheme in general has been designed in such a way as to make it easier to navigate from one area to the next. The user feels more in control of the site, rather than the other way around. For example, on the main page, the left side navigation and the top banner navigation are quite similar and offer two methods to get to the same information. Color use is also excellent for this site. The designers use only about 9 colors, and they use they to enliven the site, to aid in measurements, to show reality, and to label data. This is one of the only sites to include all four aspects of color use in the site's design. The site's ratios of graphics to text is also very well balanced, even on the main page, so that the pages load quickly and yet help to engage the readers.

They need to improve the site by providing more language versions of the site for other international visitors and customers. Also, the site would benefit from more movement associated with color. The site employs a few techniques, like mouseover graphic changes, but they need to also include more automated changes so that key points automatically gain the viewer's attention. The designers can also do a bit better with designing page titles that are more descriptive and with using more graphical navigation buttons to speed up navigation for expert users.

The Daelim site designers do a good job at making a site that follows Tufte's principles. The site scored a total of 322 out of a possible 390 points. This puts the site at the overall score of 9. It gets the 9 because of its strong showing in micro/macro design and its excellent integration of text and graphics. Although it is at the bottom range of the 9s, the designers would do well to fix a few minor areas to make the site even better and useful for users. However, to get to the next level, the designers need to come up

with designs for an each specific international audience, following the sound design decisions that they have already made.

Daewoo

The Daewoo site is available at http://www.dm.co.kr. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better sites, although definitely not one of the top 10 sites in the group.

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	9
Consistent Theme	9
Consistent Site	8
Page Titles	3
Space Well Used	8
Avail of Navigation	7
Languages	4
Languages Separate	9
TOTAL	63

Text and Graphics	Score
Combined?	9
Graphical Nav	7
Text Flow	10
Deliberate Placement	7
Ratio Graphics: Text	4
Ratio G:T Main Page	8
Use of Text and	5
Links Explained	7
Interactive Elements	9
TOTAL	66

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	7
Important First	8
Headings Used	7
Chunking	9
Horizontal Rules	9
TOTAL	50

Color	Score
Avg. # of Colors	6
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	5
TOTAL	55

Small Multiples	Score
User Controls	10
Default New Move	5
Repeated Banner	2
Repeated Logo	9
Repeated Icons	9
Repeated Nav Devices	10
Graphic Color Theme	9
TOTAL	54

The site designers give the user lots of control over where they can go in the site, how, and from where. It is easy to go from secondary section to another secondary section because of the myriad of links available. While this can be distracting and actually impede navigation, designers who can strike a good

balance make a site that is very open and navigate-able. It is also good that these designers keep the navigation in the same relative location so that all main sections are always available for users to get to from any page. Finally, the designers also flow text around graphics in a visually pleasing manner. This is especially evident on the main page as it is easy to separate the many graphics from each other and to associate them with their respective textual descriptions.

They need to improve each page by designing and repeating a page banner as part of the site design and branding. The pages need to have better titles so that users can bookmark pages and easily get back to where they intended later. Finally, the design needs to do better with the average ratio of text and graphics since many pages are too graphic intensive. The designers can fix this by using regular text for wording rather than using graphics for wording. It is very interesting that the design for the Korean version uses so many English words, while the Korean navigation is incorporated into the textual flow. This study did not delve deeper into this phenomenon, but it is worth looking into, to see if this design is due to the idea that Koreans take more time to read and find links while English speakers want quick and easy ways to get at the information.

The Daewoo site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 288 out of a possible 390 points. This puts the site at the overall score of a low 8. It gets the 8 because it does not have any scores below 2 and most scores fall in the average range. It also falls very close to the median and average scores for all Korean sites, 286.5 and 284.17 respectively. This shows that it is indeed quite average. Interestingly, it also falls at the median (281.5) and the average (280.27) scores for America and Korea together (Mexican sites have a lower overall score that brings down the combined numbers to 270.68 average and 267.5 median).

Dongjin

The Dongjin site is available at http://www.dongjinltd.co.kr. This site does an average job at designing the items that are most visible in the site. However, it is missing many of the smaller things that make up a great site.

The scores for Dongjin are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	8
Consistent Theme	8
Consistent Site	6
Page Titles	5
Space Well Used	8
Avail of Navigation	6
Languages	4
Languages Separate	8
TOTAL	63

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	8
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	8
Links Explained	7
Interactive Elements	7
TOTAL	66

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	8
Important First	9
Headings Used	3
Chunking	6
Horizontal Rules	5
TOTAL	43

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	4
TOTAL	54

Small Multiples	Score
User Controls	4
Default New Move	4
Repeated Banner	2
Repeated Logo	6
Repeated Icons	8
Repeated Nav Devices	7
Graphic Color Theme	8
TOTAL	39

By keeping the main page to a single screen on information so that the reader is free to make comparisons and navigation choices without missing out on something, the designers have made it much easier to use the site. The designers also limited the amount of graphics on each page so that they balance well with the existing content instead of overpowering it. The site also only has a limited number of colors so that they receive more emphasis. They need to improve generally in all categories for small multiple design. But, specifically, the design needs to have better repeated banners and incorporate more headings into the data so that the content is easier to scan. This will greatly improve user satisfaction, but it will also create more and better spacing around the information.

The Dongjin site designers do a semi-average job at designing an international site. The site scored a total of 265 out of a possible 390 points. This puts the site at the overall score of 7. It falls at the site-wide

average of 270.68 and the median value of 267.5. So, while it is below average within its own cultural group, it does match the average scores for all the sites.

EMS

The EMS site is available at http://www.usedcars.co.kr. The site seems to have an average design in every area except micro/macro design, where it has the lowest score of all the Korean sites.

The scores for EMS are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	10
Consistent Theme	1
Consistent Site	2
Page Titles	5
Space Well Used	4
Avail of Navigation	4
Languages	2
Languages Separate	1
TOTAL	39

Text and Graphics	Score
Combined?	3
Graphical Nav	5
Text Flow	7
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	6
Interactive Elements	5
TOTAL	61

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	9
Important First	7
Headings Used	4
Chunking	3
Horizontal Rules	5
TOTAL	38

Color	Score
Avg. # of Colors	8
Consistent Use	4
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	10
Color and Movement	1
TOTAL	49

Small Multiples	Score
User Controls	6
Default New Move	6
Repeated Banner	2
Repeated Logo	9
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	9
TOTAL	50

The site designers are quite strong on using repeated items to help orient and guide users. Although the repeated items do not always have the same look or are located in the same place, the mere fact that the navigation and the company logo are available on each page at least comes closer to tying the entire scheme together. They also scored well at keeping the ratios of graphics to text at a good medium

value. It is also impressive that the company has included a purpose statement that lets users know that they can browse the inventory and then contact them with questions. This helps to scope the site and make sure that every page works toward this purpose.

The site's scores in micro/macro design are a little too low, so the designers should really focus on improving in this area to get to the next level. In particular, the site needs to have a consistent theme applied to all the pages that is still consistent with the site's purpose. They also should work on developing more versions of the site for other cultures and languages. For the color principle, the design needs to have more movement and interaction that involves color to highlight important points and data. The most obvious placement would be some sort of moving email icon that would emphasize the purpose of wanting people to contact the company.

The EMS site scored a total of 237 out of a possible 390 points. This puts the site at the overall score of 6, but it is very close to a 7. It gets the 6 because of its inconsistent design and lack of international versions.

Hanchang

The Hanchang site is available at http://www.hccc.co.kr. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. The site still needs lots of work to make it look more professional, but it is generally usable and simple to access.

The scores for Hanchang are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	10
Consistent Theme	6
Consistent Site	6
Page Titles	4
Space Well Used	7
Avail of Navigation	2
Languages	4
Languages Separate	5
TOTAL	52

Text and Graphics	Score
Combined?	3
Graphical Nav	5
Text Flow	9
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	5
Links Explained	6
Interactive Elements	5
TOTAL	54

Layer and Separation	Score
Site Map	7
Search or Index	7
Simple Background	10
Important First	5
Headings Used	7
Chunking	4
Horizontal Rules	7
TOTAL	47

Color	Score
Avg. # of Colors	8
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	10
Color and Movement	8
TOTAL	60

Small Multiples	Score
User Controls	4
Default New Move	3
Repeated Banner	7
Repeated Logo	8
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	9
TOTAL	49

A simple, gray, lightly textured background against the black text of the foreground contrasts well, and is a great strength for this site. The designers have also chosen to use only about a 30% ratio of graphics to text across the site so that pages load very quickly and the users can focus more on the data. The design also uses a purpose statement on the splash page and on the company profile page to help the reader understand what they can expect from the site.

They need to improve the navigation availability. Currently, navigation is available at the bottom of each page, but the links on the main page open up a new browser window, which causes some disorientation when users try to use the back button. In these cases, the back button is inactive. Therefore, users can get frustrated, not realizing that they have two browser instances open at the same time and the other browser window is where they want to be. This also affects the ability of users to choose the next move they want to make, since the navigation is not immediately visible and the browser navigation is disabled. Finally, the designers need to combine text and graphics more so that they interact instead of merely serving as frames to the textual picture, as on the News page.

The Hanchang site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 262 out of a possible 390 points. This puts the site at the overall score of 7. This puts the site close to the average and median scores for all sites combined: 270.68 and 267.5 respectively.

Hankook

The Hankook site is available at http://www.hanta.co.kr. This is one of the better sites in the group because of its above-average scores in micro/macro design and integration of text and graphics. The site is not perfect, but it scored a lot of 7s and 9s, and so maintained a fairly high and consistent score across all the principles.

The scores for Hankook are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	8
Consistent Theme	9
Consistent Site	7
Page Titles	7
Space Well Used	8
Avail of Navigation	9
Languages	4
Languages Separate	8
TOTAL	70

Text and Graphics	Score
Combined?	9
Graphical Nav	3
Text Flow	8
Deliberate Placement	10
Ratio Graphics: Text	10
Ratio G:T Main Page	4
Use of Text and	8
Links Explained	6
Interactive Elements	7
TOTAL	65

Layer and Separation	Score
Site Map	5
Search or Index	5
Simple Background	7
Important First	9
Headings Used	7
Chunking	9
Horizontal Rules	9
TOTAL	51

Color	Score
Avg. # of Colors	6
Consistent Use	4
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	6
Color and Movement	8
TOTAL	52

Small Multiples	Score
User Controls	7
Default New Move	5
Repeated Banner	9
Repeated Logo	7
Repeated Icons	9
Repeated Nav Devices	4
Graphic Color Theme	6
TOTAL	47

The site designers do especially well with a couple items. First, the designers keep the main page to just barely over a screen of information so that the reader does not have to scroll in a normally sized browser window. Next, The designers do well with the deliberate placement of graphics by using alternate text and sizing attributes to help ensure that pages load quickly and things stay where they are. Last, the

designers have created a nice ratio of graphics to text across the entire site so that the graphic content helps to draw the reader in and help them navigate, so that they can find the textual content easier.

The site did not have many low scores, but there are a few areas where the design could use some improvement. The design could use more graphical navigation icons to help tie the top banner icons in with the rest of the navigation. This would also help the site's score for repeated navigation since the current implementation seems a little disjointed as far as where the navigation appears and what the user needs to click. Also, the design does not appear to have a consistent approach to how colors are used. For example, red is used with the corporate logo, but then it is also used for secondary page banners; and blue is used for the main section links, but then it is also used for the navigation background on secondary pages. Finally, the main page uses lots of graphics and text in graphics, so that there is not a lot of textual content to balance the graphics. As it is, the only plain text is the link to the English version of the site.

The Hankook site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 285 out of a possible 390 points. This puts the site at the overall score of a low 8. It gets the 8 because of its fairly high score in the micro/macro design principle. It falls very close to the median and average scores for all Korean sites, 286.5 and 284.17 respectively. This shows that it is indeed quite average for Korean sites, and very much above average for the web sites in general (270.68 average and 267.5 median).

Hyundai

The Hyundai site is available at http://www.hmc.co.kr. The site ties with the American Ford site, the highest scoring site for all American sites, for total score. It uses many of the same techniques as the Ford page, and even has a similar look to it. It is just one point behind the highest scoring Korean site, SsangYong.

The scores for Hyundai are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	9	1
Site Purpose	10	10	10	9	9	0.75
Consistent Theme	10	9	10	10	10	-0.25
Consistent Site	10	10	9	10	10	-0.25
Page Titles	8	9	7	8	8	0
Space Well Used	5	9	7	9	8	-0.5
Avail of Navigation	9	8	9	8	9	-0.5
Languages	4	4	4	4	4	0
Languages Separate	9	8	9	10	10	-1
TOTAL	75	77	75	78	77	-0.75

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	9	9	10	9	9	0.25
Search or Index	10	9	10	10	9	0.75
Simple Background	10	6	10	10	10	-1
Important First	9	7	8	8	9	-1
Headings Used	8	9	10	8	8	0.75
Chunking	9	8	9	9	9	-0.25
Horizontal Rules	7	10	10	9	9	0
TOTAL	62	58	67	63	63	-0.5

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	10	10	10	10	10	0
Default New Move	9	4	9	9	8	-0.25
Repeated Banner	5	4	3	4	4	0
Repeated Logo	10	10	10	10	9	1
Repeated Icons	6	8	9	9	9	-1
Repeated Nav Devices	10	10	9	10	9	0.75
Graphic Color Theme	8	10	9	10	10	-0.75
TOTAL	58	56	59	62	59	-0.25

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	8	8	8	0
Consistent Use	9	9	10	10	10	-0.5
Color Used	8	8	10	8	8	0.5
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	9	8	8	0.25
Color and Movement	9	10	10	10	10	-0.25
TOTAL	62	63	67	64	64	0

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	9	9	9	9	9	0
Graphical Nav	8	7	8	7	7	0.5
Text Flow	10	9	10	10	10	-0.25
Deliberate Placement	5	5	5	5	5	0
Ratio Graphics: Text	10	10	10	10	10	0
Ratio G:T Main Page	6	6	8	6	6	0.5
Use of Text and	10	9	9	9	9	0.25
Links Explained	8	8	8	8	8	0
Interactive Elements	10	10	10	10	10	0
TOTAL	76	73	77	74	74	1

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	333	327	345	341	337	-0.5

The site designers do very well with many of the categories, in all the design principles. Specifically, the site tied for the highest score in micro/macro design and color, had the second-highest score in layering and separation, and had a very good score for integration of text and graphics. The site map of the Hyundai site is a good example of micro/macro design. The sections are arranged in vertical sections with headings that are easy to see. The use of white space as a separator helps to guide the eye along the page, while the graphic and horizontal line in the center of the page separate the different sections.

The tabs on the left side of the main page are used throughout the site to remind the reader of the overall structure of the site and of the main sections that are available. The logo of Hyundai is available on all the pages, in the upper left corner, and is a link back to the main page. On the home page, this logo is enlarged and forms the backdrop to a graphic of a Hyundai vehicle. Although the year “1998” is in a larger font than the company name, which is below it, the name is spelled out in heavy, dark, all caps letters, while the year font is light gray in color, and blends in with the corporate logo.

As already mentioned, the year text is layered on top of the company logo to create a sense of unity and togetherness. The tabs on the left also are layered, as when the mouse moves over them, they change color and are highlighted. Columns are used to organize information, and the left side of the page always contains links and menus to various parts of the site, while the right side always contains either menus or the important content. The Search box on each page also separates the main tabs above from the

related, but superfluous links below. A band of white space running vertically between the tabs and the content also serves to effectively separate the two areas and distinguish them from each other.

The designers of the site have used small multiples in the form of the index tabs on the left to give a panoramic view of the site. They have also used the rounded look in their graphics to take away sharp edges and to blend in better with the text. At the top center of each page is a graphic of a vehicle and a curving arrow which points down and to the right – indicating the important information below it. The same kind of font is also used on each page in predictable places, so it helps the reader to become accustomed to the site.

Color is always used to highlight information or to point out to the reader that the image is a link. For instance, when the mouse is placed over the center text on the event page, the text changes to a non-block-like look and to a light blue color. Colors in other places are mostly muted and soft. Everywhere, that is, except with the cars, which are always depicted in life-like colors: even when they have been obviously drawn. The use of bright colors for the cars draws attention to them and gives the reader a good idea of what their purchase would look like.

Words and images are used together to lead the reader through the complicated site. Text is used on each of the graphic tabs rather than icons to create better understanding and to avoid confusion. Also, the links in the center of the Home Page contain explanations of where the links are going. And, for the menus, when the mouse is placed on top of the graphic text, the graphic is replaced by normal text.

They need to improve a couple items to push the site to the top of the rankings. First, the site design does not use a repeating, similar-looking banner to help brand each page as part of the overall site. Second, many of the graphics do not have alt text associated with them, and the graphics are not always sized. While this is a minor problem considering the good ratio of graphics to text in general, the site on the CD-ROM has many spacing problems because not all graphics have been included. Admittedly, this is not the way that most people would use the site, but it does point out the problem, and emphasizes the point that sizing helps to speed up page loading since the text can be displayed long before all graphics load on the page. Which is not possible if the graphics are not properly sized. Finally, the site would do well to develop versions of the site for other cultural visitors, much like the Ford site developed versions for many different countries and areas.

The Hyundai site designers do a remarkable job at designing a site that follows Tufte's principles. The site scored a total of 337 out of a possible 390 points. This puts the site at the overall score of 9, and in the top three sites out of all those reviewed.

Jaeil

The Jaeil site is available at http://www.enet.co.kr/jaeil/index.html. The site is only available in English, which is somewhat surprising since they claim to also manufacture items for the Korean market, as well as a Canadian market (which could imply that they should consider a French version of the site as well). However, the site has a generally clean and simple design that helps to keep it from being a poor site, instead placing it just below the general average.

The scores for Jaeil are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	9
Site Purpose	8
Consistent Theme	9
Consistent Site	9
Page Titles	6
Space Well Used	8
Avail of Navigation	3
Languages	2
Languages Separate	1
TOTAL	55

Text and Graphics	Score
Combined?	7
Graphical Nav	6
Text Flow	9
Deliberate Placement	4
Ratio Graphics: Text	8
Ratio G:T Main Page	4
Use of Text and	7
Links Explained	6
Interactive Elements	4
TOTAL	55

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	7
Headings Used	7
Chunking	9
Horizontal Rules	4
TOTAL	49

Color	Score
Avg. # of Colors	10
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	55

Small Multiples	Score
User Controls	6
Default New Move	6
Repeated Banner	9
Repeated Logo	2
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	9
TOTAL	50

The site provides users with a plain, simple, white background so as not to clutter the interface and confuse readers. They also keep the number of colors to about 9, and use them in a fairly consistent manner: blue for the corporate logo, white for background, black for text, yellow for customer service, red and gray for graphic backgrounds, greens for the organization chart, and silver and turquoise for products. Also, the site had lots of pretty good scores in the categories for small multiple repetitions (except for the logo). For example, the logo is repeated on every page, as part of the navigation system to the "About Jaeil" area. While this is not a conventional use, and the logo appears at the bottom of the page instead of the expected top of the page, it is effective in conveying the meaning of the link. The quick solution would be to also provide a larger version of the logo at the top of each page.

The site has a few other areas for improvement that would bring the site up to the next level. First, the navigation bar is only available at the bottom of the pages, and the secondary pages are all over a page long. Putting the navigation at the top or a side would help users who don't find what they are looking for on their first click, and want to know what their next default move should be. Of course, since the site is only in English, the site did not score well on the language and cultural version categories. The designers should at least develop a Korean version for their other main market. Finally, the site is sort of plain, with no movement or animation to attract readers' attention. This can be remedied fairly painlessly with a few mouseover effects on the navigation and an animation of the production process or the organization structure.

The Jaeil site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 264 out of a possible 390 points. This puts the site at a solid score of 7. The site is only slightly below the level of the average site. So, while the site does not need a lot of rework, a few touchups in several of the design principles will go a long way to improving the site and getting it well above the 270.68 average and 267.5 median.

Kia

The Kia site is available at http://www.kia.co.kr. The Kia site is another one of the top 10 sites in the entire group. The site scored many 10s and 9s, with only a couple low 4s and 5s. It is obvious, in comparison, to see that this site has been designed for an audience instead of just put together to fulfill a corporate mandate.

The scores for Kia are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	9	1
Site Purpose	7	7	8	7	7	0.25
Consistent Theme	10	9	9	9	9	0.25
Consistent Site	10	10	9	10	10	-0.25
Page Titles	9	9	10	10	10	-0.5
Space Well Used	8	6	8	8	7	0.5
Avail of Navigation	8	9	9	10	10	-1
Languages	4	4	4	4	4	0
Languages Separate	10	10	10	10	10	0
TOTAL	76	74	77	78	76	0.25

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	5	5	5	5	5	0
Search or Index	5	5	5	5	5	0
Simple Background	8	8	8	8	8	0
Important First	7	9	7	7	7	0.5
Headings Used	8	8	9	9	9	-0.5
Chunking	9	10	9	10	10	-0.5
Horizontal Rules	10	10	9	9	9	0.5
TOTAL	52	55	52	53	53	0

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	9	10	9	10	10	-0.5
Default New Move	7	9	7	7	7	0.5
Repeated Banner	9	9	7	9	9	-0.5
Repeated Logo	10	10	10	10	9	1
Repeated Icons	9	8	9	10	10	-1
Repeated Nav Devices	10	10	9	10	10	-0.25
Graphic Color Theme	10	8	9	9	9	0
TOTAL	64	64	60	65	64	-0.75

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	8	8	8	0
Consistent Use	10	8	8	8	9	-0.5
Color Used	8	8	8	8	8	0
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	8	8	8	0
Color and Movement	9	8	9	9	9	-0.25
TOTAL	63	60	61	61	62	-0.75

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	7	7	8	8	8	-0.5
Graphical Nav	7	8	7	7	7	0.25
Text Flow	10	9	10	10	10	-0.25
Deliberate Placement	8	8	10	8	8	0.5
Ratio Graphics: Text	10	10	10	10	10	0
Ratio G:T Main Page	4	6	4	4	4	0.5
Use of Text and	8	9	9	9	9	-0.25
Links Explained	9	8	8	8	8	0.25
Interactive Elements	8	9	9	9	9	-0.25
TOTAL	71	74	75	73	73	0.25

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	326	327	325	330	328	-1

The site tied for first place in small multiples and has the second-highest score in micro-macro design among all Korean sites. Additionally, the site received a high score for integration of text and graphics, which helped take it from a slightly above-average site to a top 10 site. The site is very consistent with the design and feel of the pages in each cultural version. The theme of from design to reality shows through everywhere, as in the main page where the steering wheel graphic has muted coloring, while the main Korean site page has a full color image of a car. The navigation system allows users to easily move from deep in one section to the main page of a completely different section. The site designers has also included links to the other language version on every page so that users who get into the middle of the site through things like search engines or other site links, can easily get back to the beginning and to a cultural version that fits.

Although the design does well with repetition of important items in general, the repetition of icons and navigation are especially commendable. The main navigation is always the same on every page, and the icons for secondary and tertiary pages correspond to images that the user will see in the linked to page. This is most easily seen in the Products section, where each vehicle link has a small representation of the car, along with the link text. This device also showcases the designers' excellent use of spacing around graphics and text to help guide the reader and to show how the two are connected. Simply by using some light lines from text to graphic, the designers can easily convey which graphic belongs with which text. Additionally, although the design has lots of small multiple graphics, they balance evenly with the text so

that they do not overpower the site or the page. These things are just some of the many great qualities about the site's design.

The designers do need to improve the site map and the site index. The only map the users have of the site is the navigation structure of the main sections. When the user gets into a secondary section, the left-hand links provide the rest of the site map. However, this requires more clicks than a normal site map, and can frustrate users who take a wrong link and want to know how to quickly get where they intend to go. The same information holds true for the site index or search function. The site does not have a search feature (so adding this would presumably improve the site's score in this category), and the index is simply the same thing as the site map: the navigation structure. Also, the designers need to tone down the use of graphics on the main page. While the initial graphic helps to engage the reader, it does not serve any other purpose, and distracts from the links to the English or Korean versions of the site.

The Kia site has been designed with some thought as to how the user wants to access information. It is especially impressive that the designers use two different designs for each of the cultural versions of the site. The navigation structure is fairly straightforward and the site is chunked in meaningful ways. The site scored a total of 328 out of a possible 390 points. This puts the site at the overall score of 9. It barely gets the 9 because of its strengths in small multiples and micro/macro design.

Korea Engineering

The Korea Engineering site is available at http://www.koreaeng.co.kr. Although this site is available in English and Korean, that fact is not immediately apparent because the two versions are dependant on the Import and Export links. While this makes sense and is even somewhat ingenious if the user thinks about it for a while, it is not intuitive and so may throw off many users. However, the site is generally very well designed and easy to use. The scores for Korea Engineering are as follows:

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	9
Important First	10
Headings Used	8
Chunking	9
Horizontal Rules	8
TOTAL	62

Small Multiples	Score
User Controls	7
Default New Move	9
Repeated Banner	10
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	9
TOTAL	63

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	9
Consistent Site	9
Page Titles	4
Space Well Used	8
Avail of Navigation	10
Languages	4
Languages Separate	2
TOTAL	65

Text and Graphics	Score
Combined?	8
Graphical Nav	7
Text Flow	10
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	9
Links Explained	7
Interactive Elements	8
TOTAL	72

Color	Score
Avg. # of Colors	8
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	9
TOTAL	61

The site designers do the best work in layering and separation, integration, and small multiples. Although not necessarily at the top of the list in each of these areas, they are definitely within the top 10 of most of the sites. This work is evident in the nice repetition of the company logo on each page, in the upper left corner, and in the repeated banner for the entire products section. This banner also helps to provide good navigation between all the tertiary pages in the section without requiring the user to step through each one in a predetermined order. The site design is also kept as much on one screen as possible. Although the main page is slightly over a page, the user has almost all the important information at the top of the screen. The designers have worked to consistently place the important information first on the page, with company logo, navigation, headers, and links mostly “above the fold” to allow for easy access.

They need to improve most in the areas of micro/macro design and a little bit with color use. While the color use is not horrible, and the site scored fairly well, it would receive an even better score if the design used a couple fewer colors and then used those remaining colors consistently throughout the site for emphasis and beauty. The site needs the most work, though, in two categories: languages separate and adequate page titles. As discussed previously, the use of Import and Export for the language versions is unique, but also confusing. It is not immediately apparent that this is what the user can expect, and Korean

users will have to figure out that the English word "Import" is what will take them to a site that they can more easily read. Finally, while the title "KOREA ENGINEERING" is definitely descriptive for the main page, it gets less useful for the title of the Order Form page, so that bookmarks become useless. Indeed, most browsers will want to overwrite the least recently added one with another bookmark that has the same name, thus causing users to lose some desired placeholders.

The Korea Engineering site is definitely one of the better sites, despite some obvious design blunders. The site design in general overcomes these obstacles gracefully so that the good design points far outweigh the poorer scores. The site scored a total of 323 out of a possible 390 points. This puts the site at the overall score of a very low 9. Although the site is far away from a score of 10, a few tweaks and a redesign of the cultural versions of the site will bring it much closer.

Korea Gas

The Korea Gas site is available at http://www.kogas.or.kr. This site received the third lowest score overall for all Korean sites. However, the site was fairly consistent with its own design, and tied that design fairly well with its purpose. The scores for Korea Gas are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	3
Site Purpose	9
Consistent Theme	6
Consistent Site	9
Page Titles	5
Space Well Used	8
Avail of Navigation	2
Languages	4
Languages Separate	9
TOTAL	55

Text and Graphics	Score
Combined?	4
Graphical Nav	2
Text Flow	6
Deliberate Placement	6
Ratio Graphics: Text	8
Ratio G:T Main Page	10
Use of Text and	5
Links Explained	5
Interactive Elements	4
TOTAL	50

Layer and Separation	Score
Site Map	4
Search or Index	4
Simple Background	10
Important First	4
Headings Used	7
Chunking	9
Horizontal Rules	7
TOTAL	45

Small Multiples	Score
User Controls	4
Default New Move	2
Repeated Banner	2
Repeated Logo	2
Repeated Icons	2
Repeated Nav Devices	2
Graphic Color Theme	6
TOTAL	20

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	60

The site designers do well at using a simple background, as did most other Korean sites. The designers also developed a main page that has a great ratio of text and graphics to balance out the page and help it load fairly quickly. However, the rest of the site is predominantly text, and so is harder to access than the main page, despite the long length of the main page. Also, the designers keep the number of colors down so that they mean more and can be used in a consistent way.

They need to improve the most in the principle of integration since they received the lowest Korean score. Although the most of the scores fell around a 5 or 6, the rest of the Korean sites did very well in this area, so it makes this site appear worse by comparison. They also need to do a lot of work in small multiples, where the site scored the second lowest. The main culprit behind this is the lack of repetition anywhere in the site. The designers do not reuse bullet graphics, as seen between the news page and the President's message page, nor have the designers repeated the company logo. About the only repeated element is the rainbow-colored horizontal rule, which does not really fit with the rest of the site's design anyway. The other obvious areas for improvement are the length of the main page and making the navigation more accessible. Currently, the secondary and deeper pages only have a single "Back" arrow that appears at the bottom of the page to navigate by. Part of the problem lies in the lack of significant chunking of similar information.

The Korea Gas site designers need to redesign the entire site to have one that is usable by a broad audience. The site scored a total of 230 out of a possible 390 points. This puts the site at the overall score of 6. This puts the site only about ten points away from the next level, which could be easily attained by small, incremental changes in the ten or so areas where the site scored a 1 or 2.

Kumho Chemicals

The Kumho Chemicals site is available at http://mpc.co.kr. The site seems to have an good design that makes semi-consistent use of the design principles discussed in this thesis. Mostly, the site is consistent with its own style and design. That consistency helps to make it one of the better sites, although definitely not one of the top 10 sites in the group. The scores for Kumho Chemicals:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	10	10	10	10	10	0
Site Purpose	10	10	9	10	10	-0.25
Consistent Theme	10	7	9	10	10	-1
Consistent Site	10	8	10	10	10	-0.5
Page Titles	3	5	5	3	3	1
Space Well Used	8	7	5	4	5	1
Avail of Navigation	7	6	8	8	7	0.25
Languages	4	4	4	4	4	0
Languages Separate	10	6	9	9	9	-0.5
TOTAL	72	63	69	68	68	0

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	6	8	6	6	6	0.5
Search or Index	6	6	6	6	6	0
Simple Background	7	9	7	7	7	0.5
Important First	8	6	7	7	7	0
Headings Used	8	8	8	7	7	0.75
Chunking	9	9	10	9	9	0.25
Horizontal Rules	4	4	6	6	6	-1
TOTAL	48	50	50	48	48	1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	7	7	6	7	6	0.75
Default New Move	10	9	9	9	9	0.25
Repeated Banner	10	10	10	10	10	0
Repeated Logo	10	10	10	10	10	0
Repeated Icons	10	10	9	10	10	-0.25
Repeated Nav Devices	9	9	9	9	9	0
Graphic Color Theme	8	9	8	8	8	0.25
TOTAL	64	64	61	63	62	1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	6	6	6	6	6	0
Consistent Use	10	10	9	9	9	0.5
Color Used	6	6	8	8	8	-1
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	8	8	7	8	8	-0.25
Color and Movement	9	7	10	9	9	-0.25
TOTAL	59	57	60	60	60	-1

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	7	10	9	9	9	-0.25
Graphical Nav	10	9	10	10	9	0.75
Text Flow	10	10	10	10	10	0
Deliberate Placement	10	10	10	10	10	0
Ratio Graphics: Text	8	10	8	10	10	-1
Ratio G:T Main Page	6	8	6	6	6	0.5
Use of Text and	8	6	8	8	8	-0.5
Links Explained	8	6	7	6	6	0.75
Interactive Elements	6	8	5	8	7	-0.25
TOTAL	73	77	73	77	75	0

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	316	311	313	316	313	1

The site designers score highly in several different categories of design, although the site is not particularly strong in one design principle compared with the other sites. The designers created a main page that is fairly short and to the point so that users can delve deeper into the site at whatever point they want. As the users do this, they are presented with pages of well-balanced text and graphics that are deliberately placed and sized to help to clarify and build upon the textual data. The graphics and text are also spaced apart sufficiently to allow for easy reading and drawing the users' attention to important parts, as in the Research and Development page.

The designers have also included a purpose statement in the About page that ties in very well with the site's design, emphasizing their professionalism with the muted colors, striving for quality in the organization and prose, and creativity in the many moving graphics. Finally, the designers scored well in small multiple design because the site incorporates a lot of repetition to further the design and help keep the site consistent. The only 9 score for repetition is for navigation, because the navigation sometimes changes, like how the navigation banner for the products page suddenly expands to include sublinks to product pages. While this usually works well, this section is the only one that does it, so it is unexpected.

They need to improve the page titles so that they represent more than just the company name. Part of the problem is that the site uses frames to hold a banner graphic and a perpetual link to an email address. However, even outside the frameset, the pages do not have useful titles. Second, the site is only available in English and Korean. The designers could add some more cultural versions to attract a larger audience. Finally, the site designers do not always make the best use of white space, like on the Research and

Development page where there is more space between the heading and its following paragraph than the previous section's closing paragraph and the heading. Although this is not a poor design, it is merely average compared to the scores this above-average site usually received.

The Kumho Chemicals site designers have created a unified site that is accessible by a fairly broad audience. The site scored a total of 313 out of a possible 390 points. This puts the site at the overall score of 8, but very close to a 9. By fixing the three minor problems discussed, including adding only one more language version, the designers will have a site that scores in the low range of a 9.

Kumho Tire

The Kumho Tire site is available at http://www.kumho.co.kr. The site is even better than the Kumho Chemical site, scoring as good or better in all but eight categories. The design also received the highest scores total for small multiple and micro/macro design (tying for the high score in both cases).

The scores for Kumho Tire are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	10
Consistent Theme	10
Consistent Site	10
Page Titles	9
Space Well Used	8
Avail of Navigation	8
Languages	4
Languages Separate	8
TOTAL	77

Text and Graphics	Score
Combined?	7
Graphical Nav	6
Text Flow	10
Deliberate Placement	10
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	8
Links Explained	8
Interactive Elements	7
TOTAL	72

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	10
Headings Used	7
Chunking	10
Horizontal Rules	7
TOTAL	56

Small Multiples	Score
User Controls	7
Default New Move	9
Repeated Banner	9
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	10
Graphic Color Theme	10
TOTAL	64

Color	Score
Avg. # of Colors	4
Consistent Use	8
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	56

This site is consistent with its design and consistent with its purpose as stated in its Vision page. The site design makes use of a simple background and lots of repetition of the corporate logo and navigation icons. Even with that repetition, the designers maintain a good balance of text and graphics as exemplified on the Art page. On this Art page, the text flows around the deliberately placed graphics so that the design is itself a form of art. Finally, the designers have taken the opportunity to chunk the information into many meaningful sections, which is evident from the Site Map page.

The site has room for improvement in several categories, but the ones that can use the most work are languages used and color use. As with most of the other Korean sites, this site only provides an English and a Korean version. The site also uses about 20 different colors for various things. This is a little too much, and it results in the exact opposite intended effect. Instead of giving emphasis, the things that are not colored receive the most emphasis because they are different.

The Kumho Tire site designers designed a site that is quite useful. The site scored a total of 325 out of a possible 390 points. This puts the site at the overall score of 9. The reason it gets the 9 is because the design is very strong in the areas of small multiple and micro/macro design.

Kunhwa

The Kunhwa site is at http://www.kotra.or.kr/homepage/hs87/kunhwa.html. This site takes advantage of some of Tufte's principles, but mostly the design is merely a below-average one that has several problems for international usability.

The scores for Kunhwa are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	6
Site Purpose	10
Consistent Theme	8
Consistent Site	8
Page Titles	4
Space Well Used	5
Avail of Navigation	3
Languages	2
Languages Separate	1
TOTAL	47

Text and Graphics	Score
Combined?	4
Graphical Nav	3
Text Flow	9
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	7
Links Explained	6
Interactive Elements	2
TOTAL	58

Layer and Separation	Score
Site Map	2
Search or Index	5
Simple Background	10
Important First	6
Headings Used	7
Chunking	3
Horizontal Rules	7
TOTAL	40

Color	Score
Avg. # of Colors	10
Consistent Use	8
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	53

Small Multiples	Score
User Controls	4
Default New Move	4
Repeated Banner	5
Repeated Logo	2
Repeated Icons	5
Repeated Nav Devices	5
Graphic Color Theme	8
TOTAL	33

The site includes a statement of the site's purpose of conveying their manufacturing of perfect products. To that end, the site design fulfills its purpose, at least in regards to showing the products. This simple site also has a good ratio of graphics to text, not only across the entire site, but on the main page as well (a feat that many of the Korean sites had trouble with). The designers also used just a plain background and a limited number of colors so that the emphasis is placed more on the message than on the medium.

They need to improve the site by adding more interactive elements. The only interactive piece currently is the link to an email address. The company could develop a system that could take orders online or a place where people could sign a guest book, for example. Along with that interactivity, the designers should include some movement to make the site more dynamic and persuasive. A great place to do this

would be on a site map, where the user could interact with the site to get the information they want quickly. The site can get an additional 9 points easily by including the company logo on the Products page, with the same location and look as the one on the main page.

The Kunhwa site designers have created a site that meets a specific purpose, but that is not really functional or useful beyond that. The site scored a total of 231 out of a possible 390 points. This puts the site at the overall score of 6. It gets the 6 because the designers did not take advantage of micro/macro design principles and small multiple repetition. Its strengths lie more in being a consistent, purpose-driven site.

Nam Yang

The Nam Yang site is at http://bora.dacom.co.kr/~englword/sponsor.htm. This is another example of a lackluster Korean site. It is merely a few words in English and then Korean thrown up on a web site to introduce a company's product to an international audience. But, by not planning the design or implementation, the designers have give the readers very little reason to continue exploring the site or even to check out the company further.

The scores for Nam Yang are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	10
Consistent Theme	3
Consistent Site	6
Page Titles	2
Space Well Used	7
Avail of Navigation	1
Languages	4
Languages Separate	8
TOTAL	49

Text and Graphics	Score
Combined?	6
Graphical Nav	7
Text Flow	9
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	5
Links Explained	6
Interactive Elements	2
TOTAL	62

Layer and Separation	Score
Site Map	4
Search or Index	4
Simple Background	5
Important First	6
Headings Used	2
Chunking	2
Horizontal Rules	3
TOTAL	26

Small Multiples	Score
User Controls	4
Default New Move	9
Repeated Banner	10
Repeated Logo	10
Repeated Icons	2
Repeated Nav Devices	2
Graphic Color Theme	4
TOTAL	41

Color	Score
Avg. # of Colors	6
Consistent Use	4
Color Used	4
Background Color	10
Color Scheme	10
Background/Text	9
Color and Movement	1
TOTAL	44

The site designers score well with stating their purpose up front on the main page. It is obvious that the site is meant only to introduce people to their new products, and not to help them become familiar with them, since there are no pictures or descriptions. And, since this a one page site, the design scores well on the repetition of a banner and logo (every page has them, even if every page equals just one). Also, the ratios of graphics to text are quite balanced for the site. This is mostly because the design uses lots of oversized, extraneous graphics with a lot of text all on one page, so that they cancel each other out.

They need to improve in many areas. The most interesting of which is the color use category, where this site only used one of the four potential uses for color, entertainment, and no others. It was the only Korean site to have this problem. Two Mexican sites scored similarly, using the reality and the labeling uses, respectively; and three American sites scored similarly, all three getting just the reality use. But, this is the only site that used color solely to entertain. The colors used served no other purpose. This is evident in the car background images and light glare effect in the page header. In general though, this site scored poorly in color and in layering and separation anyway. In fact, it received the lowest scores in these principles out of all Korean sites. This site had the typical other scoring problems regarding navigation and interactivity that plague other small sites, but it also scored poorly in chunking and headings since there are no headings except the main page banner and all the information is basically put into one long paragraph.

The Nam Yang site designers do a poor job at making a site that follows Tufte's principles. The site scored a total of 222 out of a possible 390 points. This puts the site at the overall score of 6. This places the site in the middle of the 6 range, where getting a higher score requires a lot of redesign and work. However, since the site does not hold the distinction of having the lowest score, there is presumably some hope yet for the site and the possibilities.

Samsun

The Samsun site is available at http://www.smipc.or.kr/smipcsearch-cgi/homepage.cgi?Co_Code:199&lnguage=0. The site has an average design that makes semi-consistent use of the design principles discussed in this thesis. The design itself is straightforward and simple, and the site is also small and simple. These things all add up to a site that has many average scores and a few bright points and a few pain points, or areas where the user has to work harder than necessary.

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	7
Consistent Theme	10
Consistent Site	8
Page Titles	4
Space Well Used	7
Avail of Navigation	3
Languages	4
Languages Separate	9
TOTAL	60

Text and Graphics	Score
Combined?	6
Graphical Nav	7
Text Flow	6
Deliberate Placement	4
Ratio Graphics: Text	8
Ratio G:T Main Page	8
Use of Text and	7
Links Explained	7
Interactive Elements	2
TOTAL	55

Layer and Separation	Score
Site Map	9
Search or Index	9
Simple Background	10
Important First	5
Headings Used	6
Chunking	3
Horizontal Rules	2
TOTAL	44

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	6
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	51

Small Multiples	Score
User Controls	4
Default New Move	9
Repeated Banner	9
Repeated Logo	9
Repeated Icons	10
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	58

A simple background matches the theme of this simple site. They keep the number of colors to a minimum and repeat the navigation bar icons on each page so the user can easily follow the trail. They need to improve the site by moving the navigation to a more accessible location or to shorten the pages so that the navigation appears at the top of the page. This would involve doing more and better chunking, which would help the site be more accessible and seem more complete because of the number of pages

available to read. Along with the infamous interactivity and movement problems, the site also needs some better horizontal (or otherwise) rules to separate those chunks of information.

The Samsun site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 268 out of a possible 390 points. This puts the site at the overall score of 7. It falls below the median and average scores for all Korean sites, 286.5 and 284.17 respectively, but is quite close to the combined numbers of 270.68 average and 267.5 median for all the sites, showing that it is just a mediocre site that is functional without being too useful.

Samsung Electro-Mechanics

The Samsung Electro-Mechanics site is available at http://www.samsung.co.kr. The site seems to have an above-average design that makes consistent use of the design principles discussed in this thesis. Although that consistency helps to make it one of the better sites, it is barely one of the top 10 sites in the Korean group.

The scores for Samsung Electro-Mechanics are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	8
Site Purpose	9
Consistent Theme	10
Consistent Site	9
Page Titles	4
Space Well Used	8
Avail of Navigation	6
Languages	2
Languages Separate	2
TOTAL	58

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	9
Deliberate Placement	4
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	9
Links Explained	8
Interactive Elements	8
TOTAL	72

Layer and Separation	Score
Site Map	5
Search or Index	8
Simple Background	10
Important First	10
Headings Used	9
Chunking	6
Horizontal Rules	9
TOTAL	57

Small Multiples	Score
User Controls	7
Default New Move	6
Repeated Banner	9
Repeated Logo	10
Repeated Icons	10
Repeated Nav Devices	10
Graphic Color Theme	10
TOTAL	62

Color	Score
Avg. # of Colors	8
Consistent Use	10
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	62

The site designers score well with using a simple white background, layering, and using a good ratio of graphics and text on all pages, even the main page. They also put the important information in the key places on the page so that the reader easily notes them. This is evident on the Profile page, where all the major links are placed at the top of the page. Additionally, the design makes a consistent use of color and a great graphic color theme to help make the site more predictable for users. For example, dark blue is for the logo, blue for links, and black for text. Finally, the design makes great use of small multiples to repeat the site's design elements. Although the banners are slightly different colors and locations, this does not distract too much from the repetition, and serves to highlight the different sections.

They need to improve the site by adding a Korean version and a few other cultural versions to reach a broader audience. The design could also use better page titling that gives the name of the section along with the ever-present company name. Finally, the designers can help the design by being more deliberate with graphic placement, including using the sizing attributes and the alt tag to label graphics. Although these are relatively minor things, they will help make the site more accessible to a wider audience.

The Samsung Electro-Mechanics site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 311 out of a possible 390 points, so it obviously scored quite well overall. This puts the site at the overall score of 8. By improving the merely average scores discussed, and opening up the design to more people, the site designers can expect to get close to the 9 range of scores.

Samsung Heavy

The Samsung Heavy site is available at http://www.shi.samsung.co.kr. The site is quite similar, score-wise to the Samsung Electro-Mechanics site. The design excelled in similar ways and it also had only a few poor design areas that need to be cleaned up. The scores for Samsung Heavy are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	9
Consistent Site	6
Page Titles	10
Space Well Used	8
Avail of Navigation	10
Languages	4
Languages Separate	8
TOTAL	74

Text and Graphics	Score
Combined?	9
Graphical Nav	9
Text Flow	10
Deliberate Placement	6
Ratio Graphics: Text	6
Ratio G:T Main Page	10
Use of Text and	7
Links Explained	8
Interactive Elements	7
TOTAL	72

Layer and Separation	Score
Site Map	5
Search or Index	8
Simple Background	9
Important First	10
Headings Used	6
Chunking	9
Horizontal Rules	8
TOTAL	55

Color	Score
Avg. # of Colors	6
Consistent Use	10
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	8
TOTAL	60

Small Multiples	Score
User Controls	7
Default New Move	9
Repeated Banner	9
Repeated Logo	2
Repeated Icons	9
Repeated Nav Devices	9
Graphic Color Theme	8
TOTAL	53

In several categories of design, this site scored very well. They have developed a site where they can keep just about every page to around one screen long so that the user hardly ever needs to scroll. This is especially true of the main page. They also use meaningful titles, like Samsung web BBS, to help the readers orient themselves in the site. Next, the design uses a consistent navigation bar along the top of the page that stays the same regardless of which section the user is in. This makes it easy to figure out what the navigation is and does, especially after going through one section. The ratio of graphics on the main page is

perfect for this site, and the text and graphic spacing is designed to allow for readability and emphasis as needed. Overall, the site also scored high, in the 7-9 range on most other categories.

They need do to improve their repetition of the company logo, however. It appears on the main page, but not in any of the brochure sections. The site map is not very useful either since it doesn't offer much more functionality than the user gets from simply going into a secondary page and clicking a link. Of course, it is useful for getting to a tertiary page quickly, but only if the user knows what the page title means since the site map does not give a lot of context. Finally, the site can also use more cultural versions, and maybe even a children's version to go along with the Disney fish graphic on the site map page.

The Samsung Heavy site designers do well at making a site that follows Tufte's principles. The site scored a total of 314 out of a possible 390 points. This puts the site at the overall score of 8, and fairly close to a 9. Although the site is not perfect, it does have many fine design qualities that the designers can be proud of and that other designers can safely emulate.

Sungbo

The Sungbo site is available at http://soback.kornet.nm.kr/~sungbo/. The site has a decent design that has a few good design points and lots of average ones. The scores for Sungbo are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	7
Site Purpose	5
Consistent Theme	7
Consistent Site	6
Page Titles	7
Space Well Used	5
Avail of Navigation	3
Languages	4
Languages Separate	8
TOTAL	52

Text and Graphics	Score
Combined?	6
Graphical Nav	5
Text Flow	4
Deliberate Placement	4
Ratio Graphics: Text	10
Ratio G:T Main Page	6
Use of Text and	5
Links Explained	6
Interactive Elements	6
TOTAL	52

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	5
Headings Used	6
Chunking	6
Horizontal Rules	5
TOTAL	44

Small Multiples	Score
User Controls	4
Default New Move	6
Repeated Banner	10
Repeated Logo	10
Repeated Icons	10
Repeated Nav Devices	9
Graphic Color Theme	4
TOTAL	53

Color	Score
Avg. # of Colors	10
Consistent Use	4
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	5
TOTAL	55

The site designers use a simple background with a limited number of colors so that the textual data is not overpowered or lost because of too much emphasis. The designers have also limited the ratio of graphics to text so that there is a nice balance to help support the text and aid in navigation, but without a lot of extraneous material. Finally, the design takes advantage of the repetition concept of small multiple design to provide users with a consistent interface and to help them make decisions easier. They need to work the most on making the navigation accessible, especially on the main page. The site scored 4s in several categories, but most of the scores revolved around the 6 range.

The Sungbo site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 256 out of a possible 390 points. This puts the site at the overall score of 7. It gets the 7 because of the problems with navigation and the few categories that scored 4s. Its strengths lie more in small multiple design and repetition of key design elements. Although it is short of the 270.68 average and 267.5 median for all sites, the site has some good design points that should be exploited more to help improve the site's ranking.

SsangYong

The SsangYong site is available at http://symc.ssy.co.kr. This site holds the distinction of having the highest score out of all the 72 sites reviewed for this thesis paper. Interestingly, this is also about the only Korean site that did not use just a plain white background. This is not to imply that a white background is bad or worse than a site that changes the background color depending on what area of the site the user enters, but it does indicate that the designers wanted to create a unique and valuable site for users where they could feel comfortable with a creative, unique company.

The scores for SsangYong are as follows:

Micro/Macro	R1	R2	R3	R4	R5	Var
Avg. Screen/ Main Page	5	5	5	5	5	0
Site Purpose	10	10	10	10	10	0
Consistent Theme	10	10	10	10	9	1
Consistent Site	10	10	10	10	10	0
Page Titles	3	3	5	3	3	0.5
Space Well Used	8	10	10	8	8	1
Avail of Navigation	9	8	10	10	10	-0.75
Languages	4	4	4	4	4	0
Languages Separate	8	9	8	8	9	-0.75
TOTAL	67	69	72	68	68	1

Layer and Separation	R1	R2	R3	R4	R5	Var
Site Map	10	10	10	10	9	1
Search or Index	8	8	8	8	8	0
Simple Background	10	10	9	9	10	-0.5
Important First	10	10	10	10	10	0
Headings Used	10	10	10	10	9	1
Chunking	10	10	9	9	10	-0.5
Horizontal Rules	8	8	8	8	8	0
TOTAL	66	66	64	64	64	1

Small Multiples	R1	R2	R3	R4	R5	Var
User Controls	9	10	9	10	10	-0.5
Default New Move	8	8	8	8	8	0
Repeated Banner	9	7	9	9	9	-0.5
Repeated Logo	10	10	10	10	10	0
Repeated Icons	9	9	8	9	9	-0.25
Repeated Nav Devices	10	10	10	10	10	0
Graphic Color Theme	8	9	8	8	8	0.25
TOTAL	63	63	62	64	64	-1

Color	R1	R2	R3	R4	R5	Var
Avg. # of Colors	8	8	8	8	8	0
Consistent Use	8	10	8	8	8	0.5
Color Used	8	8	8	8	8	0
Background Color	10	10	10	10	10	0
Color Scheme	10	10	10	10	10	0
Background/Text	9	10	9	10	10	-0.5
Color and Movement	9	8	9	10	10	-1
TOTAL	62	64	62	64	64	-1

Text and Graphics	R1	R2	R3	R4	R5	Var
Combined?	9	9	9	10	10	-0.75
Graphical Nav	6	6	6	6	6	0
Text Flow	9	10	9	10	10	-0.5
Deliberate Placement	6	6	8	6	6	0.5
Ratio Graphics: Text	10	10	10	10	10	0
Ratio G:T Main Page	10	10	10	10	10	0
Use of Text and	5	9	9	9	8	0
Links Explained	9	8	8	8	8	0.25
Interactive Elements	8	10	10	10	10	-0.5
TOTAL	72	78	79	79	78	-1

	R1	R2	R3	R4	R5	Var
GRAND TOTAL	330	340	339	339	338	-1

The site designers do very well with every design principle except micro/macro. In all the other principles, the design either ties for the highest score or actually has the highest score of all the Korean sites. In many of the categories, the site scores either a 9 or a 10, so it is definitely not an average design. Specifically, though, the following items are ones that designers should model their own sites after. First, define the site purpose clearly and up front (or in the About this Company area where users also typically expect to find it if it does not appear or is not evident from the main page. The designers then use that purpose to drive the design of the site so that it is consistent with the purpose and consistent with the design. This is evident in the compass and roughing it theme for the site, where they imply that they are the company who can lead you out of the wilderness because of their high-quality, fun vehicles. Next, the navigation is always easily accessible because the secondary pages are all just about a page long and the navigation appears at the bottom of each of those pages. Next, the designers have done a lot of chunking and linking from the general information to more specific areas so that the user just have to read the textual data that is relevant to their situation.

The user is also able to find their way around the site easier because the designers have used small multiple repetition to tie everything together, For example, the navigation icons are small representations of the main banner graphic and text for each section. Also, the design uses earth toned colored backgrounds that contrast extremely well against the black text. Another good design feature is how the designers combined text and graphics to create interest and to convey meaning, as in the woodsy look of the About the Company “A”. Of course, the designers also have a firm grasp on how to flow text around graphics so

that the text is readable and the graphics support the text. Again, the About the Company page is an excellent showcase for this. Finally, the designers have included just enough movement and interactive items like interactive maps, email links, video clips, chat rooms, and so forth, to make the site interesting. This will give the reader reasons to come back to the site later and even to bookmark favorite areas of the site.

They need to improve in three main places. First, the main page is about three screens long. This needs to be tightened up to just one page, which should be easily done with just using the large graphic on that main page and pushing the rest off to an ancillary page. Second, the page titles are quite weak: sometimes it is the company name, like on the About the Company page, and sometimes it is the section title, like on the Products page. These two ideas need to be combined so that the company name is associated with every title. Third, the site is only available in English and Korean, so the designers should start working on versions for other cultures, even versions for other English-speaking cultures, like Utah or England or Australia.

The SsangYong site designers do the best job at making a site that follows Tufte's principles. The site scored a total of 338 out of a possible 390 points. This puts the site at the overall score of a solid 9. It is a strong site that has a design that applies most of Tufte's design principles to perfection. Although there are many other sites that have good designs, this is the one site where a designer can learn a lot about what to do and what not to do, and how to design so as to accomplish Tufte's design principles to enhance cross-cultural communication.

Yukong

The Yukong site is available at http://www.yukong.co.kr. The site seems to have an average design that makes semi-consistent use of the design principles discussed in this thesis. However, the site is fairly consistent with its own style and design. That consistency helps to make it one of the better sites, although definitely not one of the top 10 sites in the group.

The scores for Yukong are as follows:

Micro/Macro	Score
Avg. Screen/ Main Page	10
Site Purpose	9
Consistent Theme	6
Consistent Site	9
Page Titles	2
Space Well Used	7
Avail of Navigation	10
Languages	4
Languages Separate	9
TOTAL	66

Text and Graphics	Score
Combined?	9
Graphical Nav	5
Text Flow	10
Deliberate Placement	7
Ratio Graphics: Text	10
Ratio G:T Main Page	10
Use of Text and	8
Links Explained	8
Interactive Elements	7
TOTAL	74

Layer and Separation	Score
Site Map	6
Search or Index	6
Simple Background	10
Important First	9
Headings Used	7
Chunking	10
Horizontal Rules	7
TOTAL	55

Color	Score
Avg. # of Colors	10
Consistent Use	6
Color Used	8
Background Color	10
Color Scheme	10
Background/Text	8
Color and Movement	1
TOTAL	53

Small Multiples	Score
User Controls	10
Default New Move	7
Repeated Banner	7
Repeated Logo	10
Repeated Icons	9
Repeated Nav Devices	10
Graphic Color Theme	8
TOTAL	61

This site scored within the top five of the Korean group for the integration of text and graphics principle. The designers use a splash page to have the reader get to either the English or the Korean versions of the site. They keep this page to merely a screen of information. Even when the user gets to the cultural version of their choosing, the main content page is barely over a screen long itself. This also helps to keep the navigation always readily accessible, especially since the navigation is contained in a side frame. Of course, the designers also use a simple white background so as not to interfere with the message of the site, and they use a limited number of colors and good ratios of text and graphics to keep the pages interesting but not overpowering. A good example of this are the main secondary pages, like the business section. Along with these graphics, the designers have designed the pages so that the text flows well around the graphics. Next, the design helps keep the user in control of the site and navigation by offering lots of

navigation options continually in the navigation frame and in the headings frame. This heading frame is repeated well, along with the corporate logo, in every subsection. Finally, the designers have chunked the information into meaningful pieces that are easy to distinguish.

They need to improve in three main areas. First, the page titles need to be reworked so that they are more than just the company name, even though the pages are framed. Second, the site can be improved with the addition of more cultural versions because this will expand the audience scope and the potential export countries. Third, the site does not use any movement or much interactivity to engage the reader, nor does the site design take advantage of dynamic web technologies.

The Yukong site designers do an average job at making a site that follows Tufte's principles. The site scored a total of 309 out of a possible 390 points. This puts the site at the overall score of 8. It gets the 8 because of its strong scores in many categories and by not having too many poor design areas. Although the site is not superb, it is definitely better than the average Korean sites, whose median and average scores are 286.5 and 284.17 respectively.

Korean Sites Scores

This section provides tables of the scores for all the Korean sites so that you can compare the scores for the sites in one location to identify patterns and more easily make categorizations.

Table 48. Korean sites Micro/Macro scores

Micro/Macro

Web Site	Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate
A-ju	9	6	9	8	8	8	10	4	8
AutoKorea	5	10	8	9	8	5	1	2	1
Daejin	10	9	7	7	5	7	10	6	8
Daelim	10	8	9	8	5	7	10	4	9
Daewoo	6	9	9	8	3	8	7	4	9
Dongjin	10	8	8	6	5	8	6	4	8
EMS	10	10	1	2	5	4	4	2	1
Hanchang	8	10	6	6	4	7	2	4	5
Hankook	10	8	9	7	7	8	9	4	8
Hyundai	9	9	10	10	8	8	9	4	10
Jaeil	9	8	9	9	6	8	3	2	1
Kia	9	7	9	10	10	7	10	4	10
Korea Eng.	10	9	9	9	4	8	10	4	2
Korea Gas	3	9	6	9	5	8	2	4	9
Kumho Chem.	10	10	10	10	3	5	7	4	9
Kumho Tire	10	10	10	10	9	8	8	4	8
Kunhwa	6	10	8	8	4	5	3	2	1
Nam Yang	8	10	3	6	2	7	1	4	8
Samsun	8	7	10	8	4	7	3	4	9
Samsung Ele.	8	9	10	9	4	8	6	2	2
Samsung Hea.	10	9	9	6	10	8	10	4	8
SsangYong	5	10	9	10	3	8	10	4	9
Sungbo	7	5	7	6	7	5	3	4	8
Yukong	10	9	6	9	2	7	10	4	9

Table 49. Korean sites Layering and Separation scores

Layering and Separation

Web Site	Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules
A-ju	6	10	10	7	8	7	5
AutoKorea	1	1	10	5	3	3	7
Daejin	7	7	8	10	7	7	8
Daelim	8	8	10	9	7	6	8
Daewoo	5	5	7	8	7	9	9
Dongjin	6	6	8	9	3	6	5
EMS	5	5	9	7	4	3	5
Hanchang	7	7	10	5	7	4	7
Hankook	5	5	7	9	7	9	9
Hyundai	9	9	10	9	8	9	9
Jaeil	6	6	10	7	7	9	4
Kia	5	5	8	7	9	10	9
Korea Eng.	9	9	9	10	8	9	8
Korea Gas	4	4	10	4	7	9	7
Kumho Chem.	6	6	7	7	7	9	6
Kumho Tire	6	6	10	10	7	10	7
Kunhwa	2	5	10	6	7	3	7
Nam Yang	4	4	5	6	2	2	3
Samsun	9	9	10	5	6	3	2
Samsung Ele.	5	8	10	10	9	6	9
Samsung Hea.	5	8	9	10	6	9	8
SsangYong	9	8	10	10	9	10	8
Sungbo	6	6	10	5	6	6	5
Yukong	6	6	10	9	7	10	7

Table 50. Korean sites Small Multiples scores

Small Multiples

Web Site	User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme
A-ju	6	5	7	1	8	9	6
AutoKorea	2	1	2	2	2	2	6
Daejin	6	9	9	10	9	10	9
Daelim	10	8	9	10	8	8	8
Daewoo	10	5	2	9	9	10	9
Dongjin	4	4	2	6	8	7	8
EMS	6	6	2	9	9	9	9
Hanchang	4	3	7	8	9	9	9
Hankook	7	5	9	7	9	4	6
Hyundai	10	8	4	9	9	9	10
Jaeil	6	6	9	2	9	9	9
Kia	10	7	9	9	10	10	9
Korea Eng.	7	9	10	10	9	9	9
Korea Gas	4	2	2	2	2	2	6
Kumho Chem.	6	9	10	10	10	9	8
Kumho Tire	7	9	9	10	9	10	10
Kunhwa	4	4	5	2	5	5	8
Nam Yang	4	9	10	10	2	2	4
Samsun	4	9	9	9	10	9	8
Samsung Ele.	7	6	9	10	10	10	10
Samsung Hea.	7	9	9	2	9	9	8
SsangYong	10	8	9	10	9	10	8
Sungbo	4	6	10	10	10	9	4
Yukong	10	7	7	10	9	10	8

Table 51. Korean sites Color scores

Color

Web Site	Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Background Color	Color Scheme	Text Contrast w/Background	Color & Movement
A-ju	8	6	10	10	10	8	1
AutoKorea	8	6	6	10	10	8	1
Daejin	6	6	8	10	10	10	8
Daelim	10	8	10	10	10	8	4
Daewoo	6	8	8	10	10	8	5
Dongjin	10	6	8	10	10	6	4
EMS	8	4	6	10	10	10	1
Hanchang	8	6	8	10	10	10	8
Hankook	6	4	8	10	10	6	8
Hyundai	8	10	8	10	10	8	10
Jaeil	10	8	8	10	10	8	1
Kia	8	9	8	10	10	8	9
Korea Eng.	8	8	8	10	10	8	9
Korea Gas	10	6	8	10	10	8	8
Kumho Chem.	6	9	8	10	10	8	9
Kumho Tire	4	8	8	10	10	8	8
Kunhwa	10	8	6	10	10	8	1
Nam Yang	6	4	4	10	10	9	1
Samsun	10	6	6	10	10	8	1
Samsung Ele.	8	10	8	10	10	8	8
Samsung Hea.	6	10	8	10	10	8	8
SsangYong	8	8	8	10	10	10	10
Sungbo	10	4	8	10	10	8	5
Yukong	10	6	8	10	10	8	1

Table 52. Korean sites Integration of Text and Graphics scores

Integration of Text and Graphics

Web Site	Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements
A-ju	8	4	10	4	4	4	5	6	7
AutoKorea	9	7	10	6	10	10	8	6	2
Daejin	6	5	9	6	10	6	8	8	8
Daelim	9	5	10	8	10	10	8	8	7
Daewoo	9	7	10	7	4	8	5	7	9
Dongjin	8	7	8	7	10	4	8	7	7
EMS	3	5	7	7	10	10	8	6	5
Hanchang	3	5	9	7	10	4	5	6	5
Hankook	9	3	8	10	10	4	8	6	7
Hyundai	9	7	10	5	10	6	9	8	10
Jaeil	7	6	9	4	8	4	7	6	4
Kia	8	7	10	8	10	4	9	8	9
Korea Eng.	8	7	10	7	10	6	9	7	8
Korea Gas	4	2	6	6	8	10	5	5	4
Kumho Chem.	9	9	10	10	10	6	8	6	7
Kumho Tire	7	6	10	10	10	6	8	8	7
Kunhwa	4	3	9	7	10	10	7	6	2
Nam Yang	6	7	9	7	10	10	5	6	2
Samsun	6	7	6	4	8	8	7	7	2
Samsung Ele.	9	5	9	4	10	10	9	8	8
Samsung Hea.	9	9	10	6	6	10	7	8	7
SsangYong	10	6	10	6	10	10	8	8	10
Sungbo	6	5	4	4	10	6	5	6	6
Yukong	9	5	10	7	10	10	8	8	7

Table 53. Korean sites total scores

Site	Total 1	Total 2	Total 3	Total 4	Total 5	Grand Total	Overall Score
A-ju	70	53	42	53	52	270	7
AutoKorea	49	30	17	49	68	213	6
Daejin	69	54	62	58	66	309	8
Daelim	70	56	61	60	75	322	9
Daewoo	63	50	54	55	66	288	8
Dongjin	63	43	39	54	66	265	7
EMS	39	38	50	49	61	237	6
Hanchang	52	47	49	60	54	262	7
Hankook	70	51	47	52	65	285	8
Hyundai	77	63	59	64	74	337	9
Jaeil	55	49	50	55	55	264	7
Kia	76	53	64	62	73	328	9
Korea Eng.	65	62	63	61	72	323	9
Korea Gas	55	45	20	60	50	230	6
Kumho Chem.	68	48	62	60	75	313	8
Kumho Tire	77	56	64	56	72	325	9
Kunhwa	47	40	33	53	58	231	6
Nam Yang	49	26	41	44	62	222	6
Samsun	60	44	58	51	55	268	7
Samsung Ele.	58	57	62	62	72	311	8
Samsung Hea.	74	55	53	60	72	314	8
SsangYong	68	64	64	64	78	338	9
Sungbo	52	44	53	55	52	256	7
Yukong	66	55	61	53	74	309	8

Sites Summary Data

The following tables show the scores for all sites, including medians and averages for all sites and for each cultural group so that you can compare the scores against each other. I have also included tables that show the best and the worst sites for each category. Sites in these tables that have a number listed in parentheses after the name indicate the score that the site received in the case where the best performer did not receive a 10 or the worst performer did not receive a 1.

Table 54. Culture totals and statistics

Culture Totals

	America	Mexico	Korea
Site 1	281	295	270
Site 2	279	272	213
Site 3	275	253	309
Site 4	282	253	322
Site 5	316	208	288
Site 6	207	212	265
Site 7	337	246	237
Site 8	297	245	262
Site 9	283	246	285
Site 10	300	236	337
Site 11	290	311	264
Site 12	333	248	328
Site 13	295	269	323
Site 14	234	220	230
Site 15	250	202	313
Site 16	306	314	325
Site 17	262	253	231
Site 18	270	199	222
Site 19	308	257	268
Site 20	267	253	311
Site 21	247	257	314
Site 22	235	218	338
Site 23	233	257	256
Site 24	246	312	309
TOTAL	6633	6036	6820
MEDIAN	280	253	286.5
AVERAGE	276.38	251.50	284.17
LOW	207	199	213
HIGH	337	314	338

K/A Median	281.5
K/A Average	280.27
All Median	267.50
All Average	270.68

Figure 8. Culture score comparative variances

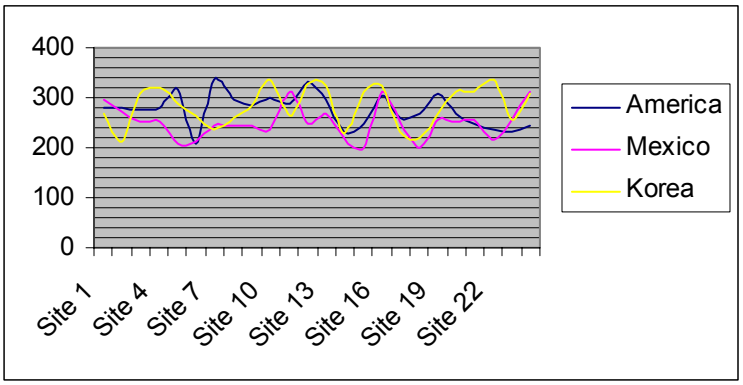

Figure 9. Culture score statistics bar graph

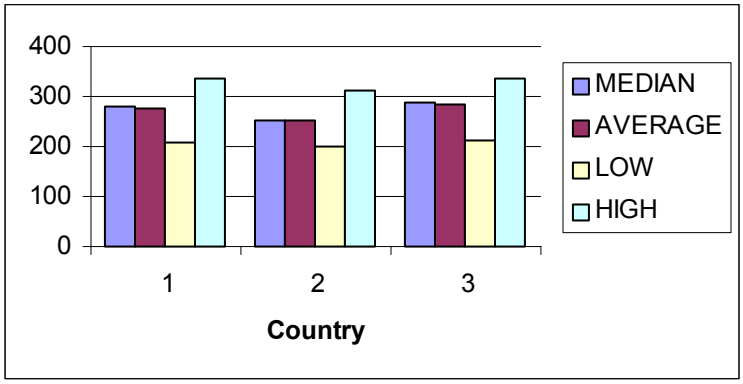

Figure 10. Culture comparative scores from high to low graph

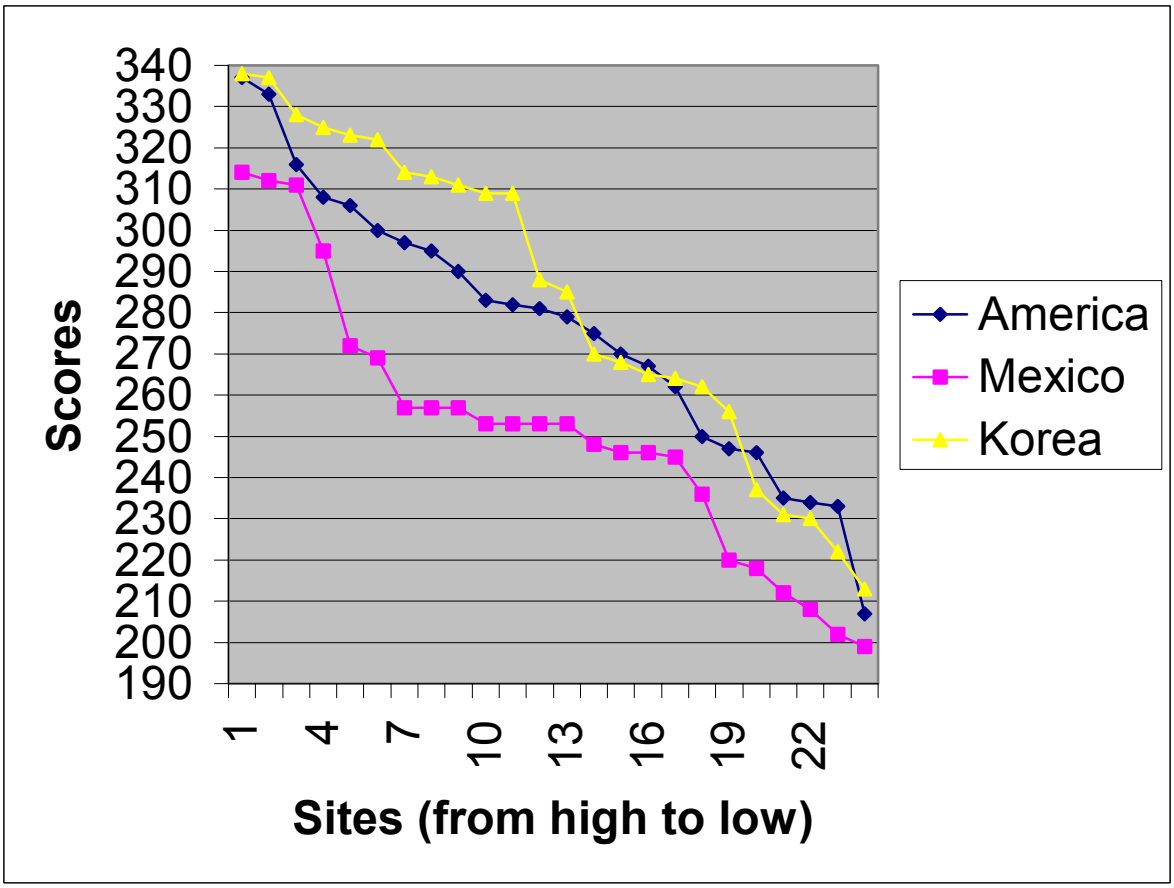

Table 55. American sites scores and statistics

America	Micro/Macro	Layering/ Separation	Small Multiples	Color	Integration Text/Graphics
AC Delco	54	54	54	59	60
Buick	54	59	45	55	66
Cadillac	54	51	55	55	60
Chevy	54	52	47	56	73
Chrysler	69	53	62	63	69
Dynacorn	40	39	26	46	56
Ford	85	57	61	61	73
GM	75	53	59	52	58
Gex	56	51	58	51	67
Harley	57	57	63	54	69
Isuzu	61	49	51	60	69
Jeep	79	60	66	63	65
Lexus	62	50	56	59	68
Mack	49	40	33	53	59
Mann	38	46	50	55	61
Mercury	72	55	54	57	68
Navistar	51	46	51	45	69
Oshkosh	48	55	54	52	61
Plymouth	72	58	55	59	64
Saturn	64	47	44	59	53
Superior	51	33	55	48	60
Titan	38	41	44	52	60
Tyres	49	35	47	52	50
Wheatley	63	43	29	60	51
TOTAL	1395	1184	1219	1326	1509
MEDIAN	55	51	54	55	62.5
AVERAGE	58.13	49.33	50.79	55.25	62.88
LOW	38	33	26	45	50
HIGH	85	60	66	63	73

Table 56. Mexican sites scores and statistics

Mexico	Micro/Macro	Layering/ Separation	Small Multiples	Color	Integration Text/Graphics
Ahmsa	63	54	60	52	66
Alfa Nemak	59	47	47	52	67
Aral Mex	54	47	51	46	55
Arbo Mex	43	41	43	62	64
Baleromex	36	28	27	62	55
Clemex	44	44	22	54	48
Dirona	59	49	36	47	55
Enermex	53	41	50	53	48
Ferrocarril	55	49	38	52	52
Filtros Mann	63	50	35	45	43
Hylsamex	69	60	57	56	69
Intehc	51	44	34	58	61
Mondial	55	45	51	46	72
Moto Roma	47	43	34	45	51
Performance	46	32	33	46	45
Piso	79	58	60	53	64
Proeza	60	58	31	51	53
Ramirez	48	32	18	47	54
Rassini	68	53	30	50	56
Tecate	63	45	43	48	54
Tepeyac	67	55	32	50	53
Tomco	46	44	25	50	53
Trebol	49	39	48	58	63
Vitro	61	58	65	58	70
TOTAL	1338	1116	970	1241	1371
MEDIAN	55	46	37	51.5	55
AVERAGE	55.75	46.50	40.42	51.71	57.13
LOW	36	28	18	45	43
HIGH	79	60	65	62	72

Table 57. Korean sites scores and statistics

Korea	Micro/Macro	Layering/ Separation	Small Multiples	Color	Integration Text/Graphics
A-ju	70	53	42	53	52
AutoKorea	49	30	17	49	68
Daejin	69	54	62	58	66
Daelim	70	56	61	60	75
Daewoo	63	50	54	55	66
Dongjin	63	43	39	54	66
EMS	39	38	50	49	61
Hanchang	52	47	49	60	54
Hankook	70	51	47	52	65
Hyundai	77	63	59	64	74
Jaeil	55	49	50	55	55
Kia	76	53	64	62	73
Korea Eng.	65	62	63	61	72
Korea Gas	55	45	20	60	50
Kumho Chem.	68	48	62	60	75
Kumho Tire	77	56	64	56	72
Kunhwa	47	40	33	53	58
Nam Yang	49	26	41	44	62
Samsun	60	44	58	51	55
Samsung Ele.	58	57	62	62	72
Samsung Hea.	74	55	53	60	72
SsangYong	68	64	64	64	78
Sungbo	52	44	53	55	52
Yukong	66	55	61	53	74
TOTAL	1492	1183	1228	1350	1567
MEDIAN	64	50.5	53.5	55.5	66
AVERAGE	62.17	49.29	51.17	56.25	65.29
LOW	39	26	17	44	50
HIGH	77	64	64	64	78

Figure 11. Micro/Macro top performers

Micro/Macro			Blue = America					
Top Performers			Red = Mexico					
			Green = Korea					
Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate
Buick	Gex	Chevy	Jeep	Ford	Ford	AC Delco	Chrysler	Jeep
Cadillac	Piso	Mercury	Ahmsa (#9)	GM	Piso	Buick	Ford	Plymouth
Chevy	AutoKorea	Superior	Hylsamex	Harley	A-ju (#8)	Chevy	GM	Vitro
Chrysler	EMS	Alfa Nemak	Piso	Isuzu	Daewoo	Chrysler	Jeep	Hyundai
Ford	Hanchang	Aral Mex	Trebol	Tyres	Dongjin	Ford	Mercury	Kia
GM	Kumho Chem.	Baleromex	Vitro	Mondial	Hankook	Isuzu	Plymouth	
Harley	Kumho Tire	Enermex	Hyundai	Moto Roma	Hyundai	Jeep	Mondial (#5)	
Jeep	Kunhwa	Filtros Mann	Kia	Kia	Jaeil	Lexus	Daejin (#5)	
Lexus	Nam Yang	Intehc	Kumho Chem.	Samsung Hea.	Korea Eng.	Plymouth		
Mack	SsangYong	Piso	Kumho Tire		Korea Gas	Moto Roma		
Plymouth		Ramirez	SsangYong		Kumho Tire	Piso		
Superior		Rassini			Samsung Ele.	Tecate		
Hylsamex		Tecate			Samsung Hea.	Vitro		
Piso		Tepeyac			SsangYong	A-ju		
Tepeyac		Hyundai				Daejin		
Daejin		Kumho Chem.				Daelim		
Daelim		Kumho Tire				Kia		
Dongjin		Samsun				Korea Eng.		
EMS		Samsung Ele.				Samsung Hea.		
Hankook						SsangYong		
Korea Eng.						Yukong		
Kumho Chem.								
Kumho Tire								
Samsung Hea.								
Yukong								

Figure 12. Micro/Macro bottom performers

Micro/Macro			Blue = America					
Bottom Performers			Red = Mexico					
			Green = Korea					
Avg. Screen/ Main Page	Site Purpose	Consistent Theme	Consistent Site	Page Titles	Space well used	Availability of Navigation	Languages	Languages Separate
Titan	Buick	Dynacorn (#5)	Moto Roma (#2)	Oshkosh (#3)	Dynacorn (#4)	Dynacorn (#2)	AC Delco	AC Delco
Korea Gas (#3)	Cadillac	Moto Roma	EMS (#2)	Baleromex (#2)	Arbo Mex (#4)	Mann	Buick	Buick
	Chevy	EMS		Tecate	Intehc	Saturn	Cadillac	Cadillac
	Mack			Nam Yang (#2)	Mondial	Wheatley	Chevy	Chevy
	Titan			Yukong	Trebol	Baleromex	Dynacorn	Dynacorn
	Alfa Nemak				Vitro	Performance	Gex	Gex
	Aral Mex				EMS (#4)	Ramirez	Harley	Harley
	Arbo Mex					AutoKorea	Isuzu	Isuzu
	Baleromex					Nam Yang	Lexus	Lexus
	Clemex						Mack	Mack
	Erermex						Mann	Mann
							Navistar	Navistar
							Oshkosh	Oshkosh
							Superior	Superior
							Titan	Titan
							Tyres	Tyres
							Baleromex	Baleromex
							Ferrocarril	Ferrocarril
							Filtros Mann	Moto Roma
							Moto Roma	Performance
							Performance	Ramirez
							Ramirez	Tomco
							Tomco	AutoKorea
							AutoKorea	EMS
							EMS	Jaeil
							Jaeil	Kunhwa
							Korea Eng.	Samsung Ele.
							Kunhwa	
							Samsung Ele.	

Figure 13. Layering and Separation top performers

Layering/Separation			Blue = America			
Top Performers			Red = Mexico			
			Green = Korea			
Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules
Ford (#9)	Ford (#9)	AC Delco	Buick	Plymouth	Cadillac	Gex (#9)
GM	GM	Cadillac	Chevy	Hylsamex (#9)	Jeep	Mercury (#9)
Gex	Gex	Chevy	Ford	Vitro	Mercury	Proeza
Harley	Harley	Ford	Lexus	Kia (#9)	Plymouth	Daewoo (#9)
Isuzu	Jeep	GM	Plymouth	Samsung Ele.	Hylsamex	Hankook
Jeep	Hylsamex (#9)	Isuzu	Piso	SsangYong	Piso	Hyundai
Lexus	Piso	Mann	Daejin		Kia	Kia
Vitro	Proeza	Mercury	Korea Eng.		Kumho Tire	Samsung Ele.
Hyundai (#9)	A-ju	Navistar	Kumho Tire		SsangYong	
Korea Eng.		Oshkosh	Samsung Ele.		Yukong	
Samsun		Titan	Samsung Hea.			
SsangYong		Tyres	SsangYong			
		Ahmsa				
		Alfa Nemak				
		Arbo Mex				
		Baleromex				
		Mondial				
		Proeza				
		Ramirez				
		Rassini				
		Tecate				
		A-ju				
		AutoKorea				
		Daelim				
		Hanchang				
		Hyundai				
		Jaeil				
		Korea Gas				
		Kumho Tire				
		Kunhwa				
		Samsun				
		Samsung Ele.				
		SsangYong				
		Sungbo				
		Yukong				

Figure 14. Layering and Separation bottom performers

Layering/Separation			Blue = America			
Bottom Performers			Red = Mexico			
			Green = Korea			
Site Map?	Search or Index	Simple Background	Important First	Headings Used	Chunking	Horizontal Rules
Isuzu	Cadillac	Moto Roma (#2)	Arbo Mex (#2)	Tyres (#2)	Superior (#2)	Dynacorn
Baleromex	Baleromex		Korea Gas (#4)	Ramirez (#2)	Tyres	Baleromex (#2)
Enermex	Enermex			Nam Yang (#2)	Ramirez (#3)	Samsun (#2)
Performance	Performance				Tecate	
Ramirez	Ramirez				Nam Yang (#2)	
AutoKorea	AutoKorea					

Figure 15. Small Multiples bottom performers

Small Multiples			Blue = America			
Bottom Performers			Red = Mexico			
			Green = Korea			
User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme
Tyres (#3)	Oshkosh (#3)	Titan (#2)	Lexus (#3)	Tyres	Dynacorn (#2)	AC Delco (#4)
Baleromex	Performance	Filtros Mann	Moto Roma	Wheatley	Wheatley	Dynacorn
Performance	Ramirez	Moto Roma	Ramirez	Baleromex	Performance	Moto Roma (#2)
AutoKorea (#2)	AutoKorea	Proeza	Rassini	Clemex	Ramirez	Nam Yang (#4)
		Tecate	A-ju	Filtros Mann	AutoKorea (#2)	Sungbo
		AutoKorea (#2)		Performance	Korea Gas	
		Daewoo		Tecate	Nam Yang	
		Dongjin		AutoKorea (#2)		
		EMS		Korea Gas		
		Korea Gas		Nam Yang		

Figure 16. Small Multiples top performers

Small Multiples			Blue = America			
Top Performers			Red = Mexico			
			Green = Korea			
User Controls	Default New Move	Repeated Banner	Repeated Logo	Repeated Icons	Repeated Nav Devices	Graphic Color Theme
AC Delco	Gex	Chrysler	AC Delco	GM	GM	Ford
Ford	Arbo Mex	Harley	Buick	Jeep	Harley	Oshkosh
Jeep	Baleromex	Tyres	Chrysler	Lexus	Jeep	Saturn
Lexus	Daejin (#9)	Performance	Ford	Navistar	Lexus	Superior
Plymouth	Korea Eng.	Vitro	GM	Titan	Plymouth	Titan
Hylsamex	Kumho Chem.	Korea Eng.	Gex	Enermex	Tyres	Ahmsa
Moto Roma	Kumho Tire	Kumho Chem.	Harley	Mondial	Tecate	Alfa Nemak
Vitro	Nam Yang	Nam Yang	Jeep	Vitro	Vitro	Arbo Mex
Daelim	Samsun	Sungbo	Mann	Kia	Daejin	Baleromex
Daewoo	Samsung Hea.		Oshkosh	Kumho Chem.	Daewoo	Hyundai
Hyundai			Tyres	Samsun	Kia	Kumho Tire
Kia			Performance	Samsung Ele.	Kumho Tire	Samsung Ele.
SsangYong			Piso	Sungbo	Samsung Ele.	
Yukong			Tecate		SsangYong	
			Vitro		Yukong	
			Daejin			
			Daelim			
			Korea Eng.			
			Kumho Tire			
			Kumho Chem.			
			Nam Yang			
			Samsung Ele.			
			SsangYong			
			Sungbo			
			Yukong			

Figure 17. Color top performers

Color			Blue = America	
Top Performers			Red = Mexico	
			Green = Korea	
Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Text Contrast w/Background	Color & Movement
AC Delco	Jeep	GM	Saturn	Buick
Cadillac	Baleromex	Isuzu	Arbo Mex	Ford
Chevy	Vitro	Clemex	Enermex	Jeep
Chrysler	Hyundai	Vitro	Daejin	Arbo Mex
Lexus	Samsung Ele.	A-ju	EMS	Hyundai
Mack	Samsung Hea.	Daelim	Hanchang	SsangYong
Plymouth			SsangYong	
Saturn				
Tyres				
Wheatley				
Alfa Nemak				
Arbo Mex				
Baleromex				
Clemex				
Dirona				
Enermex				
Proeza				
Rassini				
Tepeyac				
Trebol				
Daelim				
Dongjin				
Jaeil				
Korea Gas				
Kunhwa				
Samsun				
Sungbo				
Yukong				

Figure 18. Color bottom performers

Color			Blue = America	
Bottom Performers			Red = Mexico	
			Green = Korea	
Avg. # of Colors	Consistent Use	Color Used (L, M, R, E)	Text Contrast w/Background	Color & Movement
Vitro (#2)	Navistar (#4)	Dynacorn (#4)	Gex (#4)	Dynacorn
Kumho Tire (#4)	Aral Mex (#4)	Oshkosh	Moto Roma (#3)	Navistar
	Arbo Mex	Superior		Superior
	Dirona	Performance (#4)		Titan
	Moto Roma	Tecate		Tyres
	Ramirez	Nam Yang (#4)		Ahmsa
	Tepeyac			Alfa Nemak
	EMS (#4)			Aral Mex
	Hankook			Clemex
	Nam Yang			Dirona
	Sungbo			Enermex
				Filtros Mann
				Mondial
				Proeza
				Ramirez
				Rassini
				Tecate
				A-ju
				AutoKorea
				EMS
				Jaeil
				Kunhwa
				Nam Yang
				Samsun
				Yukong

Figure 19. Integration of Text and Graphics top performers

Integration Text/Graphics			Blue = America					
Top Performers			Red = Mexico					
			Green = Korea					
Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements
Ford	Ford	Buick	Buick	AC Delco	Gex	Chevy (#9)	Titan	Ford
Ahmsa	Harley	Chevy	Chevy	Cadillac	Harley	Gex	Hylsamex (#8)	Vitro
Alfa Nemak	Superior	Chrysler	Ford	Chevy	Mack	Superior	Daejin (#8)	Hyundai
Mondial	Arbo Mex (#8)	Ford	Arbo Mex	Chrysler	Mann	Dirona (#9)	Daelim	SsangYong
SsangYong	Kumho Chem. (#9)	Gex	Mondial	Dynacorn	Navistar	Hylsamex	Hyundai	
	Samsung Hea.	Isuzu	Moto Roma	Ford	Oshkosh	Hyundai (#9)	Kia	
		Lexus	Hankook	GM	Alfa Nemak	Kia	Kumho Tire	
		Mercury	Kumho Chem.	Gex	Aral Mex	Korea Eng.	Samsung Ele.	
		Navistar	Kumho Tire	Isuzu	Baleromex	Samsung Ele.	Samsung Hea.	
		Plymouth		Lexus	Clemex		SsangYong	
		Ahmsa		Mack	Mondial		Yukong	
		Hylsamex		Navistar	Ramirez			
		Performance		Oshkosh	Tecate			
		Piso		Superior	Tomco			
		Tepeyac		Ahmsa	Vitro			
		Tomco		Alfa Nemak	AutoKorea			
		Vitro		Aral Mex	Daelim			
		A-ju		Arbo Mex	EMS			
		AutoKorea		Baleromex	Korea Gas			
		Daelim		Dirona	Kunhwa			
		Daewoo		Hylsamex	Nam Yang			
		Hyundai		Mondial	Samsung Ele.			
		Kia		Piso	Samsung Hea.			
		Korea Eng.		Proeza	SsangYong			
		Kumho Chem.		Ramirez	Yukong			
		Kumho Tire		Tecate				
		Samsung Hea.		Tepeyac				
		SsangYong		Trebol				
		Yukong		AutoKorea				
				Daejin				
				Daelim				
				Dongjin				
				EMS				
				Hanchang				
				Hankook				
				Hyundai				
				Kia				
				Korea Eng.				
				Kumho Chem.				
				Kumho Tire				
				Kunhwa				
				Nam Yang				
				Samsung Ele.				
				SsangYong				
				Sungbo				
				Yukong				

Figure 20. Integration of Text and Graphics bottom performers

Integration Text/Graphics			Blue = America					
Bottom Performers			Red = Mexico					
			Green = Korea					
Combined?	Graphical Nav Buttons?	Text Flow Around	Deliberate Placement	Avg. Ratio Graphics: Text	Ratio G : T Main Page	Use of Text and Graphics	Links Explained	Interactive Elements
Dynacorn (#3)	Dynacorn (#2)	Enermex (#4)	GM (#4)	Jeep (#4)	AC Delco (#4)	Harley (#4)	Cadillac (#3)	Mack (#3)
Moto Roma (#2)	Saturn	Proeza	Tyres	Tomco (#4)	Buick	Mann	Ramirez	Navistar
Rassini	Tyres	Sungbo (#4)	Wheatley	A-ju (#4)	Chevy	Oshkosh		Superior
EMS (#3)	Wheatley		Clemex (#4)	Daewoo	Chrysler	Tyres		Titan
Hanchang	Baleromex		Hylsamex		Ford	Performance (#4)		Tyres
	Performance		Tecate		Jeep			Proeza
	Korea Gas (#2)		Vitro		Lexus			Ramirez
			A-ju (#4)		Plymouth			AutoKorea (#2)
			Jaeil		Saturn			Kunhwa
			Samsun		Superior			Nam Yang
			Samsung Ele.		Arbo Mex (#4)			Samsun
			Sungbo		Ferrocarril			
					Hylsamex			
					Piso			
					Proeza			
					Trebol			
					A-ju (#4)			
					Dongjin			
					Hanchang			
					Hankook			
					Hyundai			
					Jaeil			
					Kia			

APPENDIX E. THESIS WEB SITES CD-ROM

Use the included CD-ROM to view downloaded versions of the web sites evaluated in this thesis, as well as an online version of the thesis text, complete with links.

Notify the Library if the CD-ROM is missing or defective, or contact the author at thesis@garrettwinn.com.

The following figure shows an index page that provides links to each web site, provides the necessary viewers, and gives the full text of the thesis in HTML format. This index page is available on the CD-ROM accompanying this thesis. Here, you can interact directly with the web sites as they appeared during the analyses done in this thesis, instead of relying on printed versions that do not provide the same level of interaction and user experience. You can also go to the thesis web site online at http://www.garrettwinn.com/thesis to get the most up-to-date version and to join the discussion.

Figure 21. CD-ROM index page

each Web site as possible, based on their state as of June 1998.

later. We have included a compatible web browser that you can download. To view the Korean characters, you need to download and install the NJWIN program.

Introduction

Ford
- Africa
- America
- Argentina
- Australia
- Brasil
- France
- Germany
- Japan
- Korea
- Mexico
- Netherlands
- Spain
- Taiwan
- Venezuela

American

- ACDelco
- Buick
- Cadillac
- Chevrolet
- Chrysler
- Dynacorn
- Ford
- GM
- Gex
- Harley
- Isuzu
- Jeep
- Lexus
- Mack
- Mann-Hummel
- Mercury
- Navistar
- Oshkosh
- Plymouth
- Saturn
- Superior
- Titan
- Tyres
- Wheatley

Spanish

- Ahmsa
- Alfa Nemak
- Aralmex
- Arbomex
- Baleromex
- Clemex
- Dirona
- Enermex
- Ferrocarril
- Filtros Mann
- Hylsamex
- Intehc
- Mondial
- Moto Roma
- Performance
- Piso
- Proeza
- Ramirez
- Rassini
- Tecate
- Tepeyac
- Tomco
- Trebol
- Vitro

Korean

- A-Ju
- AutoKorea
- Daejin
- Daelim
- Daewoo
- Dongjin
- EMS
- Hanchang
- Hankook Tire
- Hyundai
- Jaeil
- Kia
- Korea Engineering
- Korea Gas
- Kumho
- Kumho
- Kunhwa
- Nam Yang
- Samsun
- Samsung E-M
- Samsung Heavy
- SsangYong
- Sungbo
- Yukong

Figure 22. Thesis CD-ROM

The CD-ROM is available for the printed version. Go to http://www.garrettwinn.com/Thesis to see the information that is included on the CD-ROM.