Web Usability Illustrated:
Breathing Easier with Your Usable E-Commerce Site

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The Breathing Problem

Insidious Ailment? We need a metaphor to make a subtle, but important point. We have friends who've lived in Los Angeles. They report that when the smog in Los Angeles is light, they don't feel like they're suffering. However, epidemiologists say Los Angeleans suffer health effects similar to a pack-a-day smoking habit. They are paying the price of low awareness.

Similarly, when using an e-commerce Web site, we may not feel like we're suffering. However, many new Netizens fail to get the full benefit of the Web offering due to poor usability. What's going on?

We suggest that sub-optimal usability, like smog, indeed has an endemic nature that goes largely unnoticed. We may not see "poor usability" just as we may not "see" light smog. There is a visibility problem. (Granted, flying into Los Angeles, we see the smog clearly from that exalted perspective.) And as with smog, individuals with varying degrees of sensitivity and knowledge will complain at different points of the pollution or usability index. Wouldn't it be nice for e-commerce managers to "breath easier" at night knowing their site has a clean bill of health for usability issues?

Diagnosis: In the market place, managers rank competitiveness closely with ease of use. A recent study of 212 web sites on an electronic shopping center showed that managers selected these 3 top priorities out of 33 choices:

1. Enhance competitiveness or create strategic advantage.
2. Enable easier access to information.
3. Provide new products or services to customers
   (Lederer, Mirchandani, & Sims, 1998, p. 95)

A systematic, scientific approach to e-commerce design uses human factors or ergonomic principles to minimize the visual, intellectual, mental, and physical "effort" users exert. While research shows that users typically fail to recognize "good" from "bad" design (Andre and Wickens, 1995), the market place ultimately proves a stern and accurate judge. Note, however, that using the market place as a usability monitor costs a lot of money.

Locating Symptoms: How be competitive? How be "easier"? Aye, here's the rub. Every webmaster seeks these. But uninformed, intuitive design works like smog – it grows into a pervasive but insidious and often

unseen problem. Symptoms appear as part of the "competitive gradient" as users instinctively gravitate to software that provides faster productivity, fewer errors, less learning effort, and greater subjective satisfaction: all human factors or ergonomic goals. An epidemic of missed e-commerce opportunity arises for all sites within the gradient. How can we identify the invisible problems of difficult usability? We need a usability smog monitor such as a trained professional.

Surface Treatments: Some commentators define usability as providing features such as help facilities and FAQ (frequently asked questions) pages (Lohse and Spiller, 1998). However, one could ask if a site were designed well, why should a user need "help?" The issue remains: what constitutes usable e-commerce design? User oriented functions like comparison shopping (Baty and Lee, 1995) are important. But the designs of the functions demand as much if not more attention. Note that the design given in the comparison shopping article by Baty and Lee would never pass muster from a usability specialist – it's unusable. (It requires "window thrashing" among numerous product windows.) In the last half of this article we'll give you examples of usability issues we observe in our work as interface design specialists. First, however, let's try to document signs of usability smog in the e-commerce traffic zone.

Is E-Commerce Thwarted by Usability Issues?

Evidence suggests that for an individual netizen (web-user), e-commerce usage grows with sheer experience on the web. Obviously, continued use of the web offers more chances to learn about e-commerce opportunities. How-ever, more and more new users come to the web who have already learned about e-commerce opportunities from their reading of print advertising. Thus, even with knowledge about e-commerce, novice netizens remained shy about e-shopping. Why? It may be "usability problems" that hold users back. Let's contrast e-commerce usage among experts versus novices in one important survey.

Some Data

Background The Spring, 1998 GVU 9th WWW User Survey covered over 10,000 US (84%) European (6%), Canadian (5%) and Oceania (2%) self-selected web users. New users with less than one year on the internet constituted 18% (novices); 45% used the internet for 1 to 3 years. 37% had 4 or more years experience (experts). Generally, users were fairly experienced: 88% used the web daily and 26% used it more than 20 hours per week. Connections were adequate: 87% used 28Kb/sec or faster. Of those who made purchases on the Web, 33% spent between $100 and $500; 30% spent over $500.

Buyer Reluctance GVU reports that 60% used the Web to seek product purchase information. However, in most product categories, less than 40% made a purchase in the last six months. Respondents gave these three top reasons for abandoning a Web site during personal shopping:

- Could not find the item: 56% (professional
- shopping: 62%)
- Site disorganized or confusing: 54% (61%)
- Pages downloaded too slowly: 53% (60%)

The second two reasons clearly reflect usability problems. A high "smog" index overcame these shoppers.

Novices Shop Less Novices lack web experience. For example, among Web users who find the item they want, 43% of expert respondents order all or most of the time, while only 26% of the novices do. Note that both experts and novices had found the item they wanted, but novices order less. This may reflect a lack of ease-of-use. Experience compensates for low usability. But novices without experience succumb to the "smog."

Experience Counts During the 6 months between the 8th and 9th GVU survey, users collectively ordered more frequently – probably because of more experience as well as increased product offerings and advertising. After finding the item, users placed an order…

- Most of the time (increased from ~14% (8th survey) to 27% of respondents (9th survey))
- Half the time (increased from 12% to 19%)
- Never (reduced from 27% to 13%)

All these statistics taken together, plus the rather small increases in the last paragraph, reflect a lack of shopping health due to usability smog

Given a Web context, optimal usability design will reduce the need for experience and expertise. In contrast, the current survey shows a considerable range of usage frequency among levels of user experience. 80% of experts indicated they used information searches in quest of all or most of their professional purchases, while 65% of intermediate users did so, and only 50% of novices used such searches. With better usability, we should see greater use of information searches among novices and intermediates. Experts may also increase their usage.

Collective experience also counts in the category of "time spent searching." From the 8th to the 9th survey, about 5% of users moved from the 5-15 minute search category to the less-than-5-minutes category. However, we see that the six months between surveys accelerated expert performance better than novice performance. More experts than novices moved to the under-5-minutes category, implying that interface design has not reduced learning effort for novices. "Smog alert."

Benefits of E-Commerce

The same GVU report offers this insight into the perceived value of Web-based shopping. Respondents gave these motivations for personal shopping of products and services. Most categories offer usability design challenges above and beyond just providing the functions.

- Get detailed information on products: 87% (professional shopping 92%)
- Make price comparison: 80% (83%)
- Learn availability of products and services: 78% (79%)
- Convenience: 78% (76%)
- No pressure from sales person: 66% (58%)
- Saving time: 64% (62%)
- Get vendor information: 61% 75%)
- Get reviews and expert recommendations: 31% (43%)

Bibliography

Andre, A. D. and Wickens, C. D. (1995). *When users want what's not best for them.* Ergonomics in Design 4(4), 10-14.

Baty, B. B. and Lee, R. M. (1995). *InterShop: Enhancing the vendor/customer dialectic in electronic shopping.* Journal of Management Information Systems 11(4), 9-31.

GVU (Graphic, Visualization, & Usability Center) (1998). *9th WWW User Survey.* Georgia Tech Research Corporation, Atlanta, GA.

Lederer. A. L., Mirchandani, D. A., Sims, K. (1998). *Using WISs to enhance competitiveness.* Communications of the ACM 41(7), 94-95.

Lohse, G. L. and Spiller, P. (1998). *Electronic shopping.* Communications of the ACM 41(7), 81-87.

Schaffer, E. M. (1998). *How to design usable Web sites–3 day seminar.* Human Factors International, Inc., Fairfield, IA, 52556.

Examples of Usability Design Goals and Issues

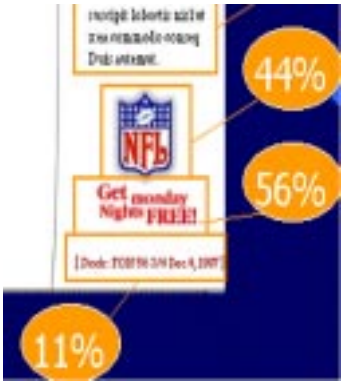
We illustrate various design issues across 5 categories of user engagement: motivation, visual work, intellectual work, memory work, and physical work. These examples help visualize the "invisible problems" that may be holding e-commerce back from its full potential (Schaffer, 1998).

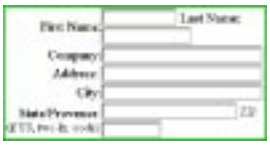
Design to Enhance Motivation

1. Target user types	Define the "persona" for each user type, then fashion a motivation plan Make theme intrinsic to the site offering	Offer selected goals per persona… · Stimulation · Ego boosting · Knowledge · Enhanced social relations · Practical solutions · Rewards · Avoidance of problems
2. Consider adopting a theme to enhance user motivation and understanding	(Postcards fit the map and travel theme) Avoid "paste-on" theme.	
3. Ensure downloads are short (5-10 seconds or less) even under poor internet conditions	(What does a 1940's bus have to do with internet communication?)	
	Avoid mixed themes (Newspaper "page" and "boulevard" collide.)	
	When pressed for speed, avoid graphic images for text headers. Use font instead.	

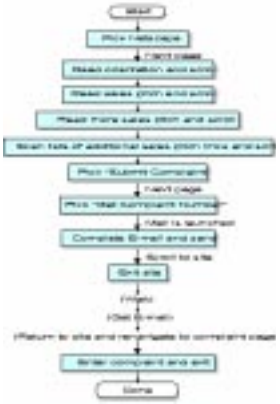
	Ensure that any image map offers true value to user in exchange for the download time (Be suspicious when told to click for "fun & adventure")	
	Reduce the number of colors to reduce size of the gif file.	Try artistic filters such as solarization, sepia, line draw, duo-tones
4. If international audience, avoid offensive images	Avoid idioms, cultural stereotypes, and images of body parts Get OKs from local authorities	
	Use internationally recognized "world images"	

Design to Reduce Visual Work

1.Provide "affordance" to controls	Make clickable controls obvious The button on the right looks clickable (has "affordance")	
	Test for self-evidency of controls ("Which areas can you click on?") User should not have to use the mouse pointer for clues!	

2. Reduce irrelevant eye movement	Avoid challenging eye movements like this. Keep a left-right, top-down task flow	
	Avoid these label placements. For languages that read left-to-right, keep labels to left of an edit field (see next).	 
3. Reduce clutter	Research shows ragged left appears cluttered Align text on left margin	 
	Create groups by color, proximity, shape, and alignment	
	Avoid irregular columns Make buttons the same width when arranged in a column	
4. Maintain reading speed	Avoid all caps for text. Users lose 14-20% in reading speed.	

Design to Reduce Intellectual Work

1. Carefully engineer user tasks	Research the task to meet user expectations and concepts	
	Aim to simplify, reduce steps (including scrolling) Perform walkthrough with collegues to get feedback before designing the site	
2. Match field length to the data	Avoid misleading users with arbitrarily long entry fields Should users enter state abbreviation or the long name? (etc.)	
3. Consider instructional prose	Avoid complexity Break into smaller steps (shown here)	

	Avoid special codes (the computer can identify the code for the user) What's the airport code for Toronto? (hint: it begins with Y!)	
	Avoid computer concepts unknown to your users	

Design to Reduce Memory Work

1. Support navigation memory	For tasks requiring frequent navigation, consider a "task panel" with continuously visible options (no memory required)	
2. Make sequence clear	Avoid arbitrary sequencing like alphabetic (unless it's names or the dictionary). User can't remember which word to look for. Task order is better (see next).	
3. Group options and tasks	The eye and memory handle about 5 lines at a time. Use blank space to group by concept. The "portfolio" buttons would make a good separate group.	

4. Avoid need for long-term memory (and consequent training)	Avoid arbitrary codes	The symbol $ indicates there is a charge the symbol ◆ indicates graphic intensity.
	Use meaningful indicators	Links marked NEW have been entered in the last 30 days. Links marked ORDER accept orders on-line. BizWeb is pro
5. Avoid interrupting short-term memory	Avoid long instructions like this. (You forget the instruction!) Consider using button labels as brief instructions (e.g., "First-time User Registration" placed at the top) Build tasks to be self-evident.	

Design to Reduce Physical Work

1. Reduce scrolling requirements	Avoid scroll requirements unless its obvious. (This page isn't obvious) Make first page self-contained, if possible	 View after scrolling
	Consider the extra work caused by icons in your menu. Is the work worth it?	
2. Avoid "window thrashing"	Pop-up windows easily get lost by users who click on the window behind the popup	

3. Minimize typing complexity	Avoid lugubrious URLs	
4. Offer large targets for mouse clicks	Avoid tiny buttons. Large buttons speeds mouse movement. Put labels on the buttons.	
5. Question "splash graphics"	A gratuitous graphic page merely means extra clicks (and waiting)