Web Design with the Brain in Mind
A Poster Synopsis

Introduction
How can web designers best follow Steve Krug's clarion call to "Don't Make Me Think!"? By keeping in mind the cognitive limitations and preferred working style of human brains.

This paper outlines the research behind the eponymous poster which I will present at LITA 2010 in Atlanta. The 3 steps a cognitively-tuned website must accomplish are to: get attention, make it easy to use, and encourage action. The poster addresses the first two steps, and this paper offers a few suggested readings for the final step.

Achtung! Getting Attention
One of the first things a website, or any type of presentation, has to accomplish is to get the attention of the user. Ware describes this as the top-down act of perception (12). A number of insights from recent research into what people notice are applicable to the design of web sites.

Unconscious Shortcuts
A fundamental insight from Weinschenk, is that “most of our decision-making and behavior is governed by unconscious processing” (7). Sure, we think of ourselves as consciously-rational beings. However, centuries of survival have shaped humans into a lean, mean, reacting machine whose unconscious acts as “a huge efficient shortcut tool, showing us what to pay attention to consciously” (Weinschenk, 10). Web developers and designers can take ethical advantage of this fact by better understanding how the unconscious prioritizes attention.

Survivalist You
One of the highest priorities for the unconscious is you and your survival. It is such a priority that, just by using the word “you”, designers can rivet the attention of the unconscious (Weinschenk, 70) because of its personal relevance. There are also a few universal stimuli that get attention and can be incorporated into designs, since the unconscious “is constantly scanning the environment looking for any changes that signal danger, food, or sex” (Weinschenk, 64). Web users, as all humans, are wired to want to eat, to avoid being eaten, to reproduce and to perceive change as a potential threat.

Another effective strategy for communicating with the unconscious is by appealing to its desire for familiarity. The brain uses “previous experience to predict where [it] should pay attention” (Medina, 75). This may be an argument for not straying too far from a “standard” web design or placement of menus on the page. The brain, in left-to-right reading cultures, may already be trained to pay attention only in the traditional “Z” pattern where the eyes scan across the top of the page for the expected global navigation.

On the other hand, developers can also get noticed by incorporating objects that change, such as blinking text or animated gifs. Because brains are wired to notice change (especially as it involves motion), it is almost impossible to ignore these types of novelties. Beware, however, of the danger that these unignorable objects will become annoying.

Our unconscious is so enamored of familiarity and obsessed with sex that “you are more likely to listen to and buy from someone who is like you and someone you find attractive” (Weinschenk, 87). A long-time marketing strategy, for example, is to associate attractive people similar to you (or to who you aspire to be) with products the marketer wants you to buy. Thus, the heart of marketing is surprisingly aligned with cognitive science.
Emotions
Gasp! Unsurprisingly, emotions also get noticed. As Medina states, “an emotionally charged event (usually called an ECS)...is the best-processed kind of external stimulus ever measured” (Medina, 80). Evolutionarily, this makes perfect sense, as emotions are one way the unconscious bypasses the slower, rational part of the brain and quickly produces a fight or flight response (Weinschenk, 109).

The Easy Button
Once a design gets attention, though, it has to keep it, and the key to doing so is to make the web site effortless.

Principle of Least Effort (PLE)
This principle is the mascot for a user-focused approach to design. One could also call this the lazy person’s law of efficiency. Based on the studies of philologist George Zipf, PLE claims that “each individual will adopt a course of action that will involve the expenditure of the...least effort” (Case, 151). Given how much the need to survive has shaped our brains and how much information overload we suffer from, it makes sense that our brains would be focused to best allocate their limited resources.

Limited Capacities
One such resource is WM (working memory, formerly called short-term memory). Medina defines WM as a collection of temporary memory capacities, limited in both capacity and duration, each specializing in processing a specific type of information (Medina, 123-125). As a general rule, we can only keep between four and seven chunks of information in our working memory (WM) at once (Eysenck, 150). Medina quotes four as the limit, and cites findings that, with increased complexity, the number of those chunks that we can retain decreases (Medina, 233).

Baddeley’s model successfully demonstrated our WM’s limited capacity. Baddeley’s research observed the difficulty of performing two tasks simultaneously when they use the same type of information, such as visual, auditory, spatial or kinesthetic (Eysenck, 166, 175). This is especially important for designers because graphics and text are both processed using the same visual capacity (Medina, 234). In other words, lots of text or lots of visual elements equal lots of little chunks which quickly fill that capacity to bursting. One way to make this easier is to include familiar information or objects, so that we are using recognition, rather than working memory (Medina, 232). This type of memory explains why multiple choice tests are less work than essay exams and why common words are easier to remember than rare words (Eysenck, 241, 247).

Finally, humans do poorly at handling tasks we perceive as complex or difficult (Case, 129). In fact, “the brain [simply] cannot multitask” (Medina, 84). And, since “too many choices overwhelm us” (Weinschenk, 53), designers are well-served to remember the old K.I.S.S. adage: keep it simple, stupid.

Seeing it All at Once
However, even though we cannot multi-task, our WM still needs to grasp the big picture or gist (Medina, 83), “there is a survival advantage to seeing the world as a whole” (Medina, 204). The primary theory about how we organize our visual perception into a whole that is greater than the sum of its parts is called Gestalt theory (Johnson, 11-24).

Ware discusses the bottom-up act of perception as having three phases, the very last of which is object recognition. The first phase is the processing of gross features, such as size, orientation, color, motion, and depth (Ware, 10). Roam labels these as pre-attentive features and adds proximity and shape to the list (Roam, 66).
Ware then describes the second phase, that of constructing patterns (Ware, 10) from common feature regions, and equates it mostly with Gestalt theory. “The grouping processes (e.g. law of similarity, law of proximity) occurring fairly early in visual processing divide the visual environment into figure (central object) and ground” (Eysenck, 124). One can understand how Roam might collate some Gestalt principles (such as proximity) with pre-attentive features, given that both occur early in the perceptual process. While there is disagreement on the exact list of grouping principles in Gestalt theory, the Chang and Nesbitt list these nine and give visual examples of: similarity, proximity, closure, focal point, figure-ground, belongingness, balance, common fate, and continuation (Chang and Nesbitt).

Both pre-attentive features and Gestalt principles are useful tools in a designer’s toolkit for making their designs easier to perceive and comprehend, as are the eight monocular cues Eysenck describes that help our 2-dimensional visual system perceive a 3-dimensional world (Eysenck, 40-42). Finally, there are a number of time-tested, universal design principles (Lidwell, et. al.) that can provide an additional framework in which to evaluate your visual design.

These are important tools because visual processing doesn’t just assist in our perception of the world; it dominates that perception, taking up half of the brain’s resources (Medina, 224, 240). So, one of the best ways to make your design easy for users to perceive is to use pictures, rather than text (Medina, 233-234). And, given our dislike of complexity, it may also be a good idea to use simple pictures.

Another tool with great power is the story. Even as “we think in pictures and visual images” (Weinschenk, 115), “a good story communicates information thoroughly and commits the information to memory” (Weinschenk, 111). This may be, in part, due to the emotion of empathy (Weinschenk, 114) that we feel for the characters in the story, since emotions can help impress memory. Another reason that stories make remembering easier, however, is that they break events down into smaller, digestible chunks that have patterns of activity and pause around transition points (Weinschenk, 113).

Encourage Action

Once you’ve gotten attention and made it easy to perceive and use your design, the final step is to encourage specific actions on the website. The poster doesn’t specifically address this persuasive final step, but areas of research that address it include: behavioral economics and game theory (Ariely); persuasive design (Fogg); and social psychology (Weinschenk). A user experience professional has even collected a number of the primary ideas from this research into a deck of cards for brainstorming designs (Anderson).

Conclusions

Visual design continues to be important in creating web experiences, especially given the predominance of vision in our mental processing. However, other cognitive factors are also important. Hopefully this paper, in conjunction with its eponymous poster, will help designers consider other cognitive influences when creating their designs. The goal? As always, to “Don’t Make Me Think!”
Bibliography


