16. To Animate or Not to Animate? – The Effects of Animation on Recall, Product Perceptions & Attitude

Yee-Lin Lai
Department of Information Systems
National University of Singapore
yeelin@comp.nus.edu.sg

Kai-Lung Hui
Department of Information Systems
City University of Hong Kong
hklung@cityu.edu.hk

Na Liu
Department of Information Systems
National University of Singapore
liuna@comp.nus.edu.sg

Abstract
An increasing number of firms are investing in animation as a tool to design more vivid and attractive Web sites. Animated content is usually invisible to search engine spiders, involves lengthier download periods and is inaccessible to the less technology-savvy users who are not equipped with the necessary software. The development costs of animated Web sites are considerably greater, commanding twice as much as static Web sites. Do these elevated prices/negative tradeoffs merit the benefits that animation has to offer? Additionally, some companies offer a choice of two versions (HTML vs. animated Flash®) of Web sites for consumer. Is the investment in creation and maintenance of two separate editions of Web sites necessary? We delve into the above research questions by justifying the potential repercussions of animation. A preliminary laboratory experiment is conducted to examine the effects animation has on recall of product information and if animation induces differences in perceptions and attitudes across product categories.

Keywords: Animation, Recall, Attitudes, Utilitarianism, Hedonism, Web Design

Introduction: The Infiltration of Animation

“Animation offers a medium of story telling and visual entertainment which can bring pleasure and information to people of all ages everywhere in the world.”
---Walt Disney

“Animation can explain whatever the mind of man can conceive. This facility makes it the most versatile and explicit means of communication yet devised for quick mass appreciation.”
---Walt Disney

Animation is increasingly prevalent on the Internet today. Research illustrates that advertisers are relying more on animated images than on static ones in their Web advertising campaigns (Sundar, Otto, Pisciotta, & Schlag, 1997). Statistics has additionally demonstrated that Flash® player, one of predominant animation viewing software, is the world's most pervasive software platform, garnering 98% of Internet-enabled desktops. Shockwave® Player, another plug-in for animation, is able to acquire a penetration rate of 52.3%. The ubiquity of such
software suggests progressive proliferation of animation components within the Web site content itself.

Compared with static HTML pages, the cost of developing animated Web pages is often higher. For instance, in the U.S.A., the cost of developing a 60-second animated Flash® clip is estimated to be around $1,200-1,500 and an enhanced page with basic Flash® accents may cost around $150 per page. In contrast, the cost of creating a simple HTML page is merely $60. Animated Web sites may take a longer period to develop - a 2-minute animation may take up to 3-4 weeks’ time. Given that animated contents are often embedded as binary objects rather than HTML text, they are regularly “invisible” to automated search engines or spiders. They are also inaccessible to less technology-savvy users who have not installed the necessary “viewers” or browser plug-ins (Schaller et al. 2004).

Given these potential detriments, it is worthy of note to observe animation being widely deployed in many Web sites. Does animation attract consumers’ attention? Will it affect how consumers perceive a product or change their attitude toward the product? Will these effects vary across products of different nature? Some companies offer a choice of two versions (basic HTML vs. animated Flash®) of Web sites for consumers. Is the investment in creation and maintenance of two separate editions of Web sites necessary? In a preliminary research study, we look into the effects of animation from three perspectives: recall, perception of a product, and attitude. One of our objectives is to examine if animation can generate better recall of a Web site per se. We further study the interaction of animation with product nature and its effects on consumers’ perception. Recent research has suggested that hedonic and utilitarian nature can affect the way products are acquired and consumed (Wertenbroch 1998), suggesting that the promotional strategies for particular product genre may vary according to their nature (Vaughn 1986). Therefore, it is useful to study the impact of animation on consumer perceptions of and attitudes toward hedonic and utilitarian products.

**Literature Review**

*What is Animation?*

Animation is defined as a dynamic visual statement, form, or structure that evolves through movement over time (Baecker and Small 1990). Several theories have explicated the psychological effects of animation. First, the *motion effect theory* posits that human being has an inherent preference for moving objects (Sundar and Kalyanaraman 2004). People undergo physiological changes (e.g., Reeves and Nass 1996) and are often more aroused when responding to motion pictures (Detenber et al. 1998). Such physiological provocation is often translated into emotional evaluations (Detenber 1996). Similarly, the *distinctiveness theory* suggests that animation can attract attention to a certain part of the screen during the early stage of information processing due to their visual distinctiveness from the rest of the stimuli (Cropper and Evans 1968). Once viewers’ attention is captured, the distinctive objects may enhance the viewers’ memory of the emphasized contents (Li and Bukovac 1999).

Prior marketing research has mostly addressed animation in the context of banner advertisements (“ads”) on Web sites. Evidence has suggested that viewers are repelled by blinking banner ads (Hamilton 1998). Yet, Hong et al (2004) have illustrated that an animated flashing item is able to attract users’ attention and facilitate quicker location of the item in certain contexts. Animated banner ads may raise brand awareness, brand preference, and purchase intention as compared with static ones (Briggs and Hollis 1997). They could also affect viewer cognitions, resulting in quicker responses and better recalls (Li and Bukovac 1999).
1999). Further, the speed of animation may influence physiological arousal, recall, and impression pertaining to the advertised contents (Sundar and Kalyanaraman 2004). Since attention is a scarce resource (Lachman et al. 1979), animation may help enhance a Web site and attract viewers’ attentions. Further, animated Web sites may be seen as more emotionally interesting and imagery provoking than static Web sites because of the dynamism conveyed by the transformation in contents. It will be useful to observe if previous results on banner ads continue to hold for Web sites.

**Product Nature: Hedonic and Utilitarian**
The nature of a product is inherently bi-dimensional (Holbrook and Hirschman 1982). The *hedonic* component is related to sensory attributes and focuses on consummatory gratifications, whereas the *utilitarian* component is related to functional and non-sensory attributes, concentrating on instrumental expectations (Batra and Ahtola 1991). The consumption of products often entails both hedonic and utilitarian dimensions, but consumers frequently characterize the products as either hedonic or utilitarian. Generally, hedonic goods provide more experiential consumption, fun, and excitement (Strahilevitz and Myers 1998). Their consumption is usually motivated by the one’s desire for fantasy, fun, and sensory pleasure. Prior literature has designated hedonic consumption to be multi-sensory, being more susceptible to receipt of experience in multiple sensory modalities including tastes, sounds, scents and visual images (Holbrook and Hirschman 1982). In contrast, utilitarian goods are largely instrumental and functional; their consumption is usually motivated by functional needs.

Investigating the concept of product nature permits researchers and managers with fresh approaches to model marketing problems, additionally providing building blocks for researcher to explain a greater proportion of variance in consumer behavior (Bagozzi and Burnkrant 1979). Preceding research has shown that the difference of hedonic and utilitarian perceptions can affect the way a product is regarded, acquired, and consumed (Wertenbroch 1998; Dhar and Wertenbroch 2000). It is interesting to examine if this difference can moderate the effect of animation in the Internet context.

**Hypotheses**

**Recall**
The limited capacity theory posits that the processing of information by human being involves continuous and simultaneous operation of several sub-processes, including encoding, storage, and retrieval (Lang 2000). Since human’s mental resource is limited, not all information can be encoded and stored in memory for retrieval. However, studies have shown that objects which elicit orienting responses in consumers may entail greater (perhaps involuntary) allocation of cognitive resources in encoding and storing the contents inside the objects (e.g. Sunder and Kalyanaraman 2004). Since animation encompasses moving and orienting objects which may draw more attention from consumers, they may allocate more cognitive resources to encode and store animated components on a Web site in their memory (relative to non-animated components).

**H1a**: The recall of animated components is higher in an animated Web site relative to the corresponding components in a static Web site.

Since human being has limited capacity to process information, more allocation of cognitive resources toward animated components would imply a decrease in resources allocated to non-
animated components. Hence, encoding and storage of non-animated components would be reduced, leading to lower recall:

**H1b:** The recall of non-animated components is lower in an animated Web site relative to the corresponding components in a static Web site.

**Perception toward a Product**

Previous research has shown that a shopping environment can offer hedonic or utilitarian values (e.g., Babin et al. 1994). The consumption can be intrinsically satisfying when the *experience* provides pleasure and fun (Holbrook and Hirschman 1982). Hence, the experience per se can be considered hedonic. Similarly, an experience that encompasses shopping efficiency or making product choices based on logical assessment of product attributes could be considered utilitarian.

Since people often exhibit correlated assessment of Web sites and the products that the Web sites carry (Dussart 2001), the hedonic or utilitarian values that a person derive from a Web experience may spill over to the products that the Web site carries (e.g. Koufaris et al. 2001). As animation is vivid, exciting and more sensory, an animated Web site is often perceived as more hedonic and playful compared with a static one. Hence, a Web site that creates a hedonic electronic environment for consumers may cause them to consider its product as more hedonic too. Therefore, we posit:

**H2a:** Consumers’ perceived hedonic value of a product will be relatively higher when the product is displayed in an animated Web environment, as compared to a static Web environment.

Similarly, a Web site that creates a utilitarian electronic environment for consumers may cause them to consider its products as more utilitarian. A static Web site may enhance its functionality or means to accomplish tasks, and hence lead consumers to view its products as more utilitarian.

**H2b:** Consumers’ perceived utilitarian value of a product will be relatively higher when the product is displayed in a static Web environment, as compared to an animated Web environment.

The fundamental law of psychophysics, known as the Weber-Fechner law, posits that any change in a person’s level of sense perception is proportionally related to the initial intensity of the stimulus that is acting on the senses. The relationship generally follows a logarithmic curve. A utilitarian product is relatively weaker along the hedonic dimension than a hedonic product. According to H2a, an animated Web site may elevate the perceived hedonic value of the product. By applying the law of psychophysics, the extent of increase would depend on the previous level of hedonic value perceived by consumers. The lower the perceived hedonic value the product possesses, the more its hedonic perception would be increased by an animated Web site. Therefore,

**H3a:** Compared to a **hedonic** product, the difference between the perceived hedonic values of a **utilitarian** product that is displayed in animated and static Web environments is greater.

Similarly, H2b posits that a static Web site may increase the perceived utilitarian value of a product. Following the similar reasoning leading to H3a, we posit:

**H3b:** Compared to a **utilitarian** product, the difference between the perceived utilitarian values of a **hedonic** product that is displayed in animated and static Web environments is greater.
Attitude

Animated advertisements have been found to generate more positive attitude toward a product than static ones (Sundar and Kim 2005). However, this effect may be moderated by the fit with the product. Previous research has found fit to be important in shaping consumer attitude in the case of Web site-product image fit (Muller and Chandon 2004), or brand image-product function fit (Park et al. 1991). Hence, whether a product is perceived to be hedonic or utilitarian may interact with its host Web site to affect consumers’ overall attitude toward the product.

An animated Web site is usually perceived by consumers as more hedonic, arousing and playful. For example, Detenber et al. (1998) found that, regardless of content, moving television images induced higher skin conductance response, a physiological assessment of autonomic arousal, than still images. Similarly, the consumption of hedonic products is primarily characterized by an affective and sensory experience of aesthetic or sensual pleasure, fantasy, and fun (Hirschman and Holbrook 1982). Hence, a good fit may exist between an animated Web site and a hedonic product, which then generates a more positive consumer attitude toward the product. Therefore, we posit:

H4a: An animated Web site generates a more favorable consumer attitude toward hedonic products as compared with utilitarian products.

A static Web site may facilitate consumers’ seeking of useful information and allow them to explore its functionality. This fits the image of utilitarian products, the consumption of which is more cognitively driven, instrumental, goal oriented, and often accomplishes functional or practical tasks (Strahileyitz and Myers 1998). Hence, we posit:

H4b: A static Web site generates a more favorable consumer attitude toward utilitarian products as compared with hedonic products.

Research Methodology

We conducted a laboratory experiment with 80 undergraduate students as subjects. The experiment took around 30 minutes and monetary incentive was awarded to the subjects. The average age of the subjects was 21 years, and 60% of them are male. We varied two factors in the experiment. First, two types of products were selected – utilitarian vis-à-vis hedonic. For hedonic, we chose portable game console and robotic dog. For utilitarian, we chose printer and calculator. For each product, two pages were created – animated vis-à-vis static. We designed the pages in such a way that when the animated Web pages came to a standstill, they appeared exactly identical to the corresponding static versions (hence, the same amount of information was presented in the animated and static versions). All animations were created using Macromedia Flash®. For convenience, we further labeled the pages with portable game console and printer as the “blue scheme”, and the ones with robotic dog and calculator as the “grey scheme”. Figure 1 shows the static versions of the Web pages that we used (the animated versions were identical, except some parts of the pages would “animate” when loaded).

As shown in Figure 1, the layout of the pages was standardized. Each Web page consisted of several parts – a brand name, a logo, a slogan, a picture and a brief description of the exhibited product. For the animations, effects including blinking, motion, and gradual fade-in were incorporated. The animations were designed in such a way that the logos and slogans would continuously animate throughout the experimental session, whereas the brand name
and description would animate only initially when they first appeared. In the static treatment, all the pages appeared as shown in Figure 1, and no animation was involved. Fictitious brand names were used for all products to avoid a priori brand influence.

<table>
<thead>
<tr>
<th>Blue Scheme</th>
<th>Grey Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hedonic Product</strong></td>
<td></td>
</tr>
<tr>
<td>Game Console</td>
<td>Calculator</td>
</tr>
<tr>
<td>Robotic Dog</td>
<td>Printer</td>
</tr>
<tr>
<td>Hedonic Score 4.843 (0.919)</td>
<td>Calculator 2.929 (1.037)</td>
</tr>
<tr>
<td>Utilitarian Score 3.792 (0.957)</td>
<td>Printer 3.571 (0.972)</td>
</tr>
</tbody>
</table>

Figure 1. Design schemes of Web pages

Before the experiment, we conducted a pretest to ensure that the selected products were appropriate. Twenty university students (who did not participate in the main experiment) were tasked to read a short description with a picture of a product in each product category (i.e., hedonic vis-à-vis utilitarian). They were then requested to rate their perception along the hedonic (fun, exciting, delightful, thrilling, and enjoyable) and utilitarian (necessary, effective, helpful, functional, and practical) dimensions on a 7-point scale. The items for hedonic/utilitarian perception were adapted from Voss et al. (2003). Table 1 presents the mean hedonic and utilitarian scores for each of the included products.

<table>
<thead>
<tr>
<th></th>
<th>Game Console</th>
<th>Robotic Dog</th>
<th>Calculator</th>
<th>Printer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedonic Score</td>
<td>4.843 (0.919)</td>
<td>4.907 (1.116)</td>
<td>2.929 (1.037)</td>
<td>3.571 (0.972)</td>
</tr>
<tr>
<td>Utilitarian Score</td>
<td>3.792 (0.957)</td>
<td>3.050 (1.003)</td>
<td>5.967 (0.687)</td>
<td>5.375 (0.813)</td>
</tr>
</tbody>
</table>

Post hoc t-tests showed that there were significant differences in hedonic and utilitarian scores across the portable game console-calculator, portable game console-printer, robotic dog-calculator and robotic dog-printer pairs, and all p-values were less than 0.05. Hence, we concluded that portable game console and robotic dog were good representatives of a hedonic product, and calculator and printer were good representatives of a utilitarian product.

To increase the cost-effectiveness of the experiment, each subject was tasked to view the Web pages of two products, and the two products differed in terms of color scheme (blue vis-à-vis grey) and nature (hedonic vis-à-vis utilitarian). To avoid demand bias, however, we

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10 In other words, each subject would always view one hedonic and one utilitarian product, and one blue-scheme and one grey-scheme product.
constrained the subjects to view either static or animated versions. Hence, animation was a between-subject factor, whereas product type was both a between- and within-subject factor. The sequence of the Web pages was randomized to eliminate any ordering effect. Each subject was given two minutes to view the page of a product. After the subjects viewed a product, they were asked to answer several questions pertaining to their recall of the product, perceptions and attitudes.

To further avoid the subjects from memorizing the task and questions, we added a filler task (with several questions that were completely different from the other two tasks) after they viewed the first product to distract their attention. Pursuant to completing the filler task, the subjects were tasked to view the second product. Figure 2 shows the sequence of events in the experiment.

![Figure 2: The flow of the experiment](image)

**Dependent Measures**

Recall: After the subjects finished viewing a product, the Web site was culminated and they were asked to write down the product category, brand name, color of the logo, and slogan of the product. Further, they were asked to record any details that they could recall, such as technology used, or any other features that were mentioned in the description. These questions were aggregated to derive two measures – recall-A (for the animated components on the page) and recall-S (for the static components on the page). Responses were coded for product category recall, brand recall, color recall, slogan recall, and recall for information other than the designated four. Recall-A was computed by summing the first four values, and Recall-S was the value of last one. We adopted the principles in Hong and Wyer (1990) to judge the correctness of the recalls. Two independent coders inspected the answers to see if they conveyed the same idea as presented by the Web pages. The average inter-coder reliability was 83.5%.

Hedonic / utilitarian perceptions: We adapted the scales from Voss et al. (2003) to evaluate the subjects’ hedonic and utilitarian perceptions. The Cronbach’s alphas for the hedonic and utilitarian scale were 0.872 and 0.896 respectively.

Attitude: We adapted the scale from Grossbart et al. (1984) to measure the overall attitude of the subjects toward a product. The Cronbach’s alpha was 0.903.

**Manipulation Checks**

Color Scheme: We conducted independent t-tests for the dependent measures within the different color schemes and found no significant differences.

Order of Presentation: Independent t-tests were also conducted for the dependent measures for various orders of presentation and no significant disparities were detected.

**Data Analysis**

Table 2 presents the descriptive statistics of the dependent measures. 7-point scales were used for hedonic/utilitarian perceptions and overall attitude. The score for recall-A ranged from 0 to 4, and the score for recall-S ranged from 0 to 5.
To test the first hypothesis, we conducted a series of independent sample t-tests. As predicted, the score for recall-A was higher for the animated Web pages than the static pages \((t = 3.714, p < 0.05)\), while the score for recall-S was higher for static Web pages than the animated pages \((t = -5.223, p < 0.05)\). Hence, both H1a and H1b were supported.

| Table 2: Descriptive Statistics for the Dependent Measures |
|---------------------------------|-------|-------|-------|
|                                | Mean  | S.D.  | Max  | Min  |
| Recall-A                       | 3.064 | .7855 | 4.000| 1.000|
| Recall-S                       | 2.350 | 1.132 | 5.000| 0    |
| Hedonic Score                  | 4.676 | 1.172 | 7.000| 1.400|
| Utilitarian Score              | 4.831 | 1.143 | 7.000| 1.600|
| Overall Attitude               | 5.234 | .9027 | 7.000| 2.167|

Similarly, we conducted independent sample t-tests to compare the utilitarian and hedonic values of the products under different presentations. The results are shown in Table 3. Animated Web pages raised the subjects’ hedonic perception of the products relative to static Web pages \((t = 2.767, p < 0.01)\). Hence, H2a was supported. However, contrary to H2b, animated Web pages also raised the subjects’ utilitarian perceptions of the products \((t = 2.054, p < 0.05)\). Hence, H2b was not supported.

| Table 3. Hedonic and Utilitarian Perceptions of the Products |
|-----------------------------------------------------------|-------|-------|-------|-------|
|                                | N     | Mean  | Standard Deviation | Mean Difference |
| Hedonic Score                  | Animated | 80   | 4.928            | 1.0965          | 0.503          | 0.006          |
|                               | Static  | 80   | 4.425            | 1.1980          |                |
| Utilitarian Score             | Animated | 80   | 5.015            | 1.0995          | 0.368          | 0.042          |
|                               | Static  | 80   | 4.648            | 1.1633          |                |

We conducted a two-way ANOVA to test H3a and H3b, which concerned the interaction between product nature (hedonic vis-à-vis utilitarian) and presentation type (animated vis-à-vis static) on consumers’ hedonic and utilitarian perceptions of the products. The result showed that there were no significant difference in hedonic \((F = 0.002, p = 0.96)\) and utilitarian \((F = 0.717, p = 0.40)\) score across the product nature × presentation type interaction. Hence, both H3a and H3b were not supported.

Finally, we performed a two-way ANOVA to test H4a and H4b, which concern the fit of product nature to Web site presentation. The results indicated that there was a significant product nature × presentation type interaction effect on overall attitude \((F = 9.07, p < 0.01)\). Static Web sites generated more favorable attitude toward utilitarian products \((t = -3.070, p < 0.05)\). Animated Web sites generated more favorable attitude toward hedonic products, but this difference was not statistically significant \((t = 1.264, p = 0.21)\). Hence H4b was supported, but not H4a.

Discussion and Implications
Our study theoretically developed and empirically validated some potential impacts of animation in the Web environment. The support of H1a and H1b suggests that recall was enhanced for the animated elements relative to the static objects. These results propose that
firms and web designers should exercise caution and business acumen when implementing animation within their Web sites. They need to determine the marketable features and important information of the product in order to animate correspondingly, such that they can be easily recollected by the consumers. Conversely, inconsequential attributes should be distinguished as static components within a Web site.

Our results further demonstrated that an animated Web site is able to motivate consumers to perceive the product introduced in the Web site in a more hedonic light. However, the analyses of the static Web site did not support the hypothesized positive effect on the utilitarian value of the product. One possible reason could stem from the mediating role of consumers’ involvement. Pleasure is believed to be an antecedent of involvement (Laurent and Kapferer 1985). The higher the level of pleasure a consumer feels, the more highly involved one will be in the Web site. Since an animated Web site forms a more pleasant electronic environment for consumers, it facilitates a higher level of involvement in the Web site. Higher Web site involvement leads to more time and intensity of effort expended in pursuing the objective (Stone 1984). With each Web page consists of a description regarding the functionality of product, more information would be attended by the highly-involved consumers and more functionality aspects would be processed and recollected. As such, it is plausible that consumers’ perceived utilitarian value of the product would increase. Given the lack of support for hypothesis 2b, it is not surprising that both hypotheses 3a and 3b are not corroborated since their justification follows the former.

The outcomes from the analyses of hypotheses 4a and 4b demonstrate the importance of a fit between the Web site impression and product image. From a practical perspective, our findings indicate that companies need to be cautious when developing Web sites to exhibit their products. Firms should consider the category of product and the premeditated position of the product when contemplating on the creation of an animated and/or static Web site. The determination of whether a utilitarian product deserves the high implementation cost of an animated Web site requires detailed justification.

From a theoretical perspective, this study looks beyond the traditional animation research on banner advertisements, and focuses on the how the animation techniques would operate simultaneously as a whole Web site to present a product. Further, it also functions as a pioneer attempt to fill the disparity between animation research and hedonism/utilitarianism research, an amalgamation which may have significant influence on customizing the adoption of animation.

**Concluding Remarks**

Some limitations of this study should be highlighted. Firstly, bounded by technological capabilities and resources, the stimulus material comprises of only one Web page, which might be insufficient in initiating the effect motivated by a real Web site. Secondly, the subjects were instructed to browse the Web pages in a forced exposure situations. It may be more insightful if the study is replicated employing one that is not constrained by the conditions of the laboratory. It may additionally be functional to include measures that specifically evaluate subjects’ perceived fit between the product nature and the use of animation within the web sites. Familiarity with products could pose as a factor that affects the dependent measures, particularly the aspect of recall. Future studies could incorporate more concise pretests that preclude this feature. Further research should also explore the potential mediating role of involvement in the Web site- attitude relationship. Practical
insights can be harvested by delving into the subsequent effects of animation, such as consumer purchase intentions. Additionally, it will be interesting to understand how animation may create differing degrees of compelling online experience across different product categories by examining the concept of flow (Novak, Hoffman and Yung, 2000). In summary, firms and web developers should habitually rationalize the use of animation against tradeoffs. If the firms’ objectives in institution of animation in a Web site are fortuitous, then the relative simplicity, accessibility and familiarity of a HTML static version might be the wiser choice. Our results offer several insights for a thoughtful consideration that may result in a worthier marketing investment.

References


