

Aesthetics, Visual Appeal, Usability and User Satisfaction: What *Do* the User's Eyes Tell the User's Brain?

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Abstract

The impact of colour on the first impression of a website is discussed in the light of several rather puzzling experimental findings, which suggest that background colour and colour combinations might influence users' subsequent opinion of, and satisfaction with, a site. Theories of, and approaches to, studying aesthetics and emotion are outlined briefly. It is concluded that, although the *criteria* by which people judge visual appeal, user satisfaction and trustworthiness are still unclear, perceived usability appears to be related to the detection of stumbling blocks that hinder smooth interaction with a web site and probably to the orderliness of screens. User satisfaction is a complex construct that incorporates several measurable concepts and is the culmination of the interactive user experience. Experimental results suggest that people may be more satisfied with a beautiful product that performs sub-optimally than with a more usable but less appealing product. A glance into the future importance of the topics discussed is offered.

Keywords: Aesthetics; emotion; user satisfaction; first impression; mere exposure effect.

Introduction

When visiting an art exhibition, why do people dwell for 30 minutes in front of one painting and only 10 seconds in front of another? What is it that makes one experience so compelling - and another barely noticeable, even when two paintings are of the same genre, painted in the same period, in the same style, and by the same artist? I stumbled across this question nearly a decade ago after obtaining some rather puzzling results in a usability test of a local Government web site (Lindgaard 1999). In that evaluation one group of participants rated perceived usability and satisfaction after completing a standard usability test that exposed the worst of the usability problems identified in the preceding heuristic evaluation. Since participants managed to complete only one half of the tasks successfully, it is safe to assume that they would be unimpressed with the site. However, it was puzzling that both satisfaction and perceived usability ratings were just as low in the control condition in which another group of participants had merely browsed the site for a short time without performing any usability tasks or encountering usability problems while browsing the site.

Our research suggests that the relative appeal of visual stimuli is closely related to both user satisfaction and perceived usability. It also suggests that judgments of visual appeal and satisfaction may, at least in some contexts, depend heavily on the first impression of such stimuli and on the emotion they evoke in the user that set the scene for the entire interactive user experience. This paper explores some of these relationships in an effort to furnish plausible explanations accounting for curious results such as those found in abovementioned web site.

Definitions and theories of experimental aesthetics and the link of these to human emotion are outlined briefly next, followed by a description of research that appears to underline the immediate, first impressions and reactions to salient visual stimuli. The difficult problem of studying colour is then touched upon to underscore the complexity of the relationships among all these concepts. The paper concludes with a glance into the future importance of understanding the role of visual appeal in shaping the user experience affecting user satisfaction as well as on human performance.

Definitions and Theories of Aesthetics

Aesthetics is variously defined as beauty in appearance (Lavie & Tractinsky 2004), visual appeal (Lindgaard & Dudek 2003), an experience (Ramachandran & Blakeslee 1998), an attitude (Cupchik 1993), a property of objects (Porteous 1996), a response or a judgment (Hassenzahl 2004a;2004b), and a process (Langer 1967). Common to all of these terms is that aesthetics is seen to have something to do with pleasure and harmony which human beings are capable of experiencing. The wide variety of definitions testifies to the complexity of the concept, which has not deterred researchers from working in this still rather nebulous and evasive area.

Early studies in experimental aesthetics led to several theories, the most comprehensive of which was formulated by Berlyne (1971;1972). Berlyne's research showed consistently that moderate complexity was preferred over simple or extremely complex stimuli. Theoretically, this was interpreted to mean that, beyond a certain level of complexity, the subject's arousal level would be located on the downwards slope of the inverted-U curve that characterizes the arousal function, at a point at which the experience increased in unpleasantness hand in hand with increasing complexity.

From this work, Berlyne proposed the so-called ‘collative-motivation’ model according to which aesthetic behaviour was conceived as an elaborate form of explorative behaviour driven by pleasure-inducing arousal fluctuations. Key determinants of arousal fluctuation were termed ‘collative variables’, which entailed either a comparison of stimulus elements (for example, complexity) or aspects of experience (for example, novelty). One prediction of the model was that intermediate levels of arousal would be preferred, leading to the classic inverted U-shaped complexity-preference function. This prediction was confirmed in numerous studies using abstract visual patterns such as dots and random polygons as stimuli. However, when more concrete, real-world stimuli were introduced such as paintings, buildings, and furniture, the model’s predictive performance was markedly attenuated (Whitfield 2000). In these studies, preferences were characterized by the categories to which the stimulus belonged. That is, they were based on the degree to which the stimulus represented the category. A ‘categorical’ model was proposed to account for these results (Whitfield & Slatter 1979; Whitfield 1983). This model conceived of aesthetics in terms of information processing demands, whereby stimuli were not processed per se, but rather judged in the context of the category to which they were assigned. This same phenomenon is well known in studies of human decision making in which the ‘representativeness bias’ (for example, Kahneman, Slovic & Tversky 1982) features prominently among an entire family of judgmental biases. Representativeness proved an effective predictor of preference in studies of aesthetics using real-world stimuli.

An attempt to reconcile the two opposing theories resulted in the bi-polar ‘categorical-motivational’ model (Whitfield 2000) that incorporates both categorical and motivational drivers. The human-centred goal is the modulation of categories leading to greater fitness of purpose. In the categorical-motivational model, categories are assumed to be well formed and closed to further articulation at one end of the continuum, and ill formed, open to further articulation, at the other. Affect would be strongest for stimuli representing the well-formed categories that would maximally conform to expectations. Such stimuli would require minimal processing. At the other extreme, novel stimuli would result in the strongest affect provided these would contain sufficient redundancies to permit assignment to a category. Maximum novelty would thus be assumed to be non-categorisable and therefore incapable of assimilation. The underlying assumption is that the value of assimilable stimuli is to elaborate the category structure thereby providing ‘knowledge’. Novel stimuli would thus have positive value to the extent that they contribute to internal category elaboration and differentiation. A thorough discussion of these models may be found in Whitfield (2000) and in Lindgaard and Whitfield (2004).

Despite this progression in predictive and speculative human response models, considerable confusion surrounds the concept of aesthetics as alluded to earlier. As indicated earlier, some researchers regard aesthetics as properties of an object associated with its “beauty” (Tractinsky, Katz & Ikar 2000), a concept that has been further refined into what Tractinsky and his colleagues have recently termed “classical aesthetics” (Lavie & Tractinsky 2004), which is similar to Hassenzahl’s notion of “goodness” (Hassenzahl 2004), and “expressive” aesthetics, that Hassenzahl calls “beauty”. However, even the term “beauty” has at least five clearly distinguishable meanings in philosophy:

In the context of a metaphysical consideration of the world’s order, beauty is equated with its orderliness [*Tractinsky’s “classical aesthetics” and property of objects*]. In the epistemological context derived from Baumgarten, beauty is thought of as adequacy to the mind in perception [*Hassenzahl’s “goodness”, inside the viewer’s head*]. From the

anthropological point of view it may seem to be nothing more than sensual attractiveness [*Berlyne's work on arousal; Norman's (2004) notion of "visceral emotion"*]. To the legislators of taste it tends to become one aesthetic quality variously differentiated among a number. Those reflecting more generally upon criticism may use it to mean 'aesthetic excellence' [*Tractinsky's "expressive aesthetics"*]: that is, as an almost empty term, standing for a problem rather than for its solution (Spearshott 1963: 59).
[comments and italics added]

Yet, as acknowledged by Spearshott none of these senses of the term correspond to its normal usage, being applied "chiefly to women and weather" (Lindgaard & Whitfield 2001: 375). Aesthetics, like beauty, is thus as elusive as it is confusing. The similarity or overlap between beauty and aesthetics remains undefined; we are unsure about what is being judged (Frohlich 2004), whether they are properties of objects in the world, subjective experiences, emotional reactions residing "in the eye of the beholder", or cognitive judgments (Hassenzahl 2004a;2004b; Norman 2004; Frohlich 2004). Aesthetics therefore lacks an affinity with the main paradigms of psychological and HCI research, and has no secure theoretical attachment point: it lacks a home. Yet, even if aesthetics is a property of objects, when confronted with an object of beauty, it does evoke a positive emotional experience in the viewer.

From Aesthetics to Emotion

To the extent that aesthetics is a pleasant experience or an experience that leads to pleasure, it implies a relationship to emotion. Without going into details of the current emotion literature, a valuable review of current emotion theories may be found in Martin and Clore (2001). For the present purpose of showing the link between aesthetics and emotion, only Norman's (2004) recent discussion of emotion is mentioned here. Norman conceives of emotion in term of three levels of processing. The subconscious visceral level is perceptual and gives rise to immediate judgments. Recent research has shown unequivocally that judgments at this level can be made reliably after a stimulus has been shown for only 50 milliseconds (Lindgaard, Dudek, Fernandes & Brown 2006). The finding is important because it suggests that this immediate judgment is a biologically determined effect (Zajonc 1980) which occurs at a subconscious level before the brain has had time to evaluate the stimulus at a cognitive level. It is based, as it were, on "what my body tells me to feel" rather than on "what my brain tells me to think". This is discussed in more detail in the next section.

Norman's second level of emotion, the behavioural level, is expectation-driven and also still subconscious. At that level, a judgment of appeal is thus likely to be based on a comparison of what the user expects to see, hear, touch, smell, or taste, and the degree to which the stimulus actually meets this pre-determined expectation. The third level in Norman's model is reflective, intellectually-driven. At that level, the web user encountering a new web site may be focusing on usability problems if the first impression was negative, and on the enjoyable aspects of the site if the first impression was positive. Thus, whereas the emotion at the visceral level is holistic and diffuse, the sum of those initial feelings now combine into an emotion that enables the user to decide if the web site is great or otherwise. In terms of Whitfield's (2000) categorical-motivational model that decision would depend on the degree to which the site would meet expectations; these are themselves based on the sum of experienced sites of the same genre and the extent to which that genre is already well-defined and thus closed to further articulation. It is reasonable to argue that web sites in general have not reach a level of articulation like, for example, gothic or renaissance

churches, and that therefore users' internal criteria for judging a site is based on issues other than whether the site fits a fixed model of similar sites inside their heads.

The Role of the First Impression and its Effect on the Subsequent Interactive Experience

The above discussion of aesthetics and its effect on emotion leads to thoughts on the first impression – how quickly it is formed, how long it lingers on, and its effect, if any, on other, unrelated activities such as judging the likeability of a fictitious person or traversing a web site effectively.

To decide just how quickly a first impression is formed, think about what happens when you first meet a new person. You 'know' instantly whether that person makes you feel comfortable or otherwise. That 'knowledge' is not the result of a rational, considered response; it is indeed the physiological response that Norman (2004) refers to as the visceral level of emotion. Empirical evidence supporting this rapid decision making was first provided in the behavioural literature by Zajonc (1980) who coined the term 'mere exposure effect'. Typically, Zajonc would show his experimental participants numerous slides of similar meaningless random dot patterns, polygons, or Japanese ideograms, for 1-20 msec in the first round. In the second round, he paired stimuli previously seen with new ones, asking participants which they preferred. His results showed reliably that people preferred images they had seen before. In addition, as the number of exposures in the first round increased, preferences in the second round became more extreme. However, participants had no recollection whatsoever of having seen any of the images before; apparently, their level of 'familiarity' with the preferred stimuli belonged squarely in the pre-attentive sphere in which an organism has not yet had a chance to analyse or evaluate the incoming stimuli. That is, cognition had not had time to register what the participants' eyes had seen.

Zajonc's experiments sparked a lively debate in the literature on whether 'emotion' actually precedes 'cognition' or vice versa; his findings were subsequently replicated and confirmed in hundreds of experiments (Bornstein 1992). About a decade later, LeDoux (1994;1996), a neurophysiologist, reported findings revealing "beyond the shadow of doubt" (Damasio 2000: 70; LeDoux 1992) a small bundle of neurons that lead directly from the hypothalamus to the amygdala across a single synapse. This contradicts the traditional view that stimuli travelling along the visual pathway from the retina in the eye via the hypothalamus and the thalamus, to the occipital cortex where they are interpreted for meaning before sending signals back to the amygdala in the limbic system that is the 'seat of emotion'. This more recently discovered bundle of neurons allows the amygdala to receive direct inputs from the sensory organs and initiate a response within a few milliseconds, *before* the neocortex has interpreted the meaning of the stimuli (LeDoux 1994). Thus the amygdala does not depend entirely on signals from the neocortex as originally believed, and Zajonc's early findings are beginning to converge with more recent theoretical explanations of human emotion as well as with empirical evidence.

The mere exposure effect begins to wane once the stimulus exposure time exceeds 50msec, when the organism begins to take more detailed information into consideration. Therefore, if visual appeal is appraised within that window of 50 msec, as indeed a series of experiments in our lab showed clearly to be the case (Fernandes, Lindgaard & Dillon 2003; Lindgaard et al. 2006), the judgment involves the amygdala over which the neocortex has no control. The organism's response can thus truly be said to be visceral (Norman 2004). This has important implications for web design and budget resource allocation, because the value of textual information is likely to be assessed in terms of the site's immediate visual appeal. So, an e-

commerce web site representing a business that is in competition with numerous others on the Internet and that fails to meet users' expectations both in terms of aesthetics and in terms of its informative content is unlikely to be successful at converting browsers to customers even if its quality of products or services is superior to its competitors. Either people will instantly click on to the next site, or they will interpret even the slightest usability flaw negatively to confirm their initial emotional impression. By contrast, a visually appealing site will be forgiven for its minor or even major usability blemishes because the first impression was positive.

Thus there is evidence that findings emerging from neurophysiology are converging with those contributed from psychology, supporting the claim that emotion *can* precede cognition and that, at least in some instances, the decision to like or dislike an incoming stimulus is based on the interpretation of a visceral response that is felt rather than thought (Damasio 2000).

From Experience to User Satisfaction

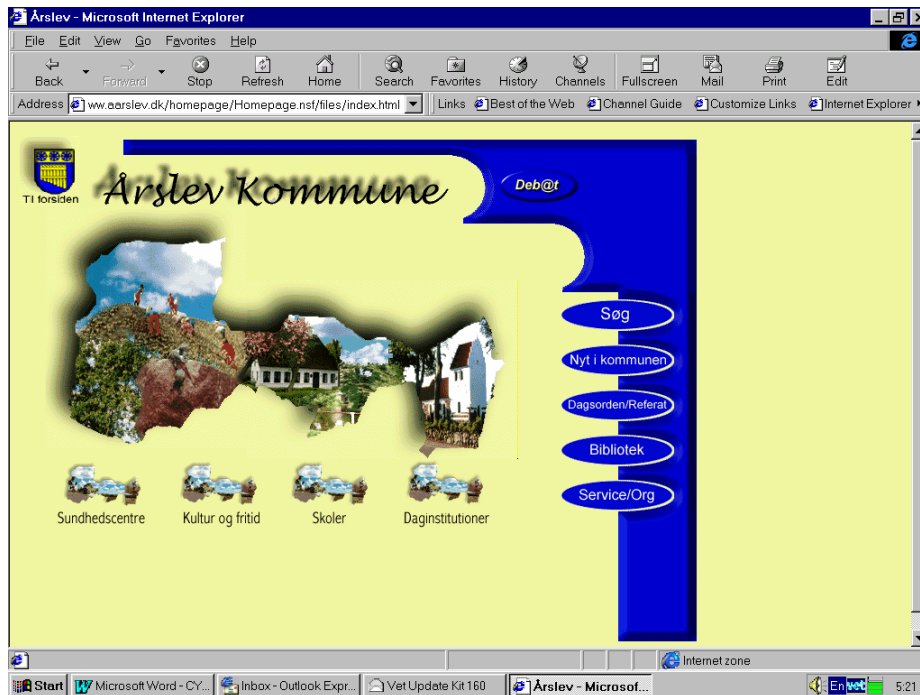
According to some researchers, design is about user experience rather than about the creation of products (Buxton 2005). The purpose of physical objects is to "engage us in an experience – an experience that is largely shaped by affordances and character embedded in the product itself" (Buxton 2005: 47). The term "affordances", although used in the sense of Gibsonian (Gibson 1966) perception meaning "action possibilities", it actually refers to "perceived affordances" as identified by Norman (1988). By "character", Buxton means the experiential aesthetic value. Buxton discusses his experiences with three different juicers which, although two of these are very similar in design look-and-feel, give rise to qualitatively different experiences. Thus, Buxton sees the user experience as the combination of visual as well as experiential aesthetics and usability – the visceral indicator of the degree of pleasantness of the experience coupled with the reflective emotional and cognitive judgment of the product's utilitarian usability aspects. This example suggests that user satisfaction is a statement about, or a judgment of, the user experience.

Let us therefore return to the puzzling user satisfaction data mentioned in the beginning of this paper in an effort to tease out possible explanations for the results. In that usability test, none of the subjects knew the Danish county represented by the web site, the homepage of which is shown in Figure 1 (see over page).

It should be noted that local Government in Denmark is responsible for all social services including tax collection, registration of citizens for kindergarten, school, nursing home placement or temporary home nursing requirements, unemployment benefits and the enforced activation of people who have lost their job, as well as handling building permits, road repairs, and other those other services offered by local Governments elsewhere in the world. Every individual is given a unique ID number at birth that follows her throughout her life, even when moving from one part of the country to another. It is therefore reasonable to assume that a Government that knows virtually everything about its citizens' lives is not generally regarded with a great deal of affection.

One possible reason for the results is that the satisfaction ratings reflected subjects' attitude towards their country's local Government rather than being the result of their interaction with the particular web site. If, however, subjects were actually judging the site, then Whitfield's (2000) categorical-motivational model may account for the findings in the sense that, while subjects' attitude towards local Government may be very clear and not necessarily positive, the same would not be true of their expectations towards Government websites in general. A

Figure 1. The homepage of the local Government web site tested.



cursory inspection of a sample of 50 Danish and 50 Canadian local Government sites showed that there were no recognizable commonalities between them in the look and feel, the design principles adhered to, the site architecture, or navigation paths. The local Government website category is thus quite unformed and still open to further articulation.

Another possible reason is that the first impression was negative, leading test users to look selectively for negative information to support that first impression. Background colour is a very salient feature of a web site especially a site that is not very 'busy' looking. It is possible that the very strong and lingering perceptual after-effect that participants reliably experienced after viewing the bright yellow and blue homepage for even a brief period of time was unpleasant.

This is especially true when it occurs unexpectedly, possibly rendering the browsing experience slightly unpleasant also and hence lowering satisfaction and perceived usability scores. Especially the yellow colour was considerably brighter and more saturated on the original site than in the reproduction shown in Figure 1. However, the reader may still experience a mild perceptual after-effect by fixating on the black dot near the centre of the page for two minutes, then look away, preferably onto a white wall. The blue and yellow areas in the Figure will now be reversed. In particular, the blue area will appear brightly yellow.

Colour is a very salient stimulus, which is known to affect the visual appeal of web sites (Knutson 1998); when opening a site the background colours are usually displayed well before the content appears. The literature on human memory, from social psychology, and from attribution theory, accords with the research on first impressions discussed earlier. First impressions are very powerful; they often outweigh subsequent incoming stimuli – thus, primacy effects prevail! Likewise, borrowing from the human judgment and decision-making

literature, we also know that, once people have made up their mind about something, they tend to search selectively for information that confirms their hypothesis, falling prey to the so-called confirmation bias (Mynatt, Doherty & Tweeney 1977) whereby disconfirmatory information is ignored. It follows that an unpleasant first impression will encourage the viewer to focus on information affecting their experience negatively, perhaps in the form of usability problems. Conversely, if the first impression is positive, they are likely to be far more tolerant of the same usability problems. Given the presence of a strong perceptual after-effect in the abovementioned web site, one may therefore legitimately question the impact of background colours on both the first impression and the overall interactive user experience. That is discussed next.

The Impact of Colour on the Interactive Experience

Early studies in the psychology of art found that two very bright and highly saturated primary colours juxtaposed in a painting create what the researchers referred to as “maximum tension” in the viewer (Kreitler & Kreitler 1972). The abovementioned blue/yellow web site fulfilled this criterion. Unfortunately, it is unclear what exactly Kreitler and Kreitler meant by “maximum tension” but one may speculate that it refers to “interestingness” in the sense defined by Berlyne (1971;1972) in his studies of arousal mentioned earlier.

The background colour of a web site is usually displayed for several seconds before additional information appears. Following Zajonc’s (1980) work on the mere exposure effect discussed earlier and our own work showing that users form an opinion on the visual appeal of homepages after an exposure time of only 50 milliseconds (Lindgaard et al. 2006), there should be ample time for the user to detect the stimulus and decide whether to like or dislike it well before the information contained on the homepage is even displayed. The first few anecdotal studies in our program therefore focused on the importance of colour in an attempt to begin to explore the connection between visual appeal, perceived usability and user satisfaction with web sites. Because these studies have been reported elsewhere (Lindgaard 1999), they are only summarized briefly here.

In an informal preliminary experiment, a group of 90 computer science / HCI students were first asked to nominate their most and least favoured website and to explain their choices. Almost without exception, students cited colour as the main reason for *disliking* a web site, whereas content was the reason stated for *favouring* a site, even when they were equally interested in the content of all selected sites. To assess colour preferences, the students were then given a list of 27 randomly selected organizations such as retail outlets, service providers, and professional societies and asked to name the background colour and shade (pastel, medium, dark) they considered most and least appropriate for each site. Qualitative issues such as brightness and saturation were not mentioned. The results showed clearly that white and blue were considered most appropriate, that yellow and black were seen as being least appropriate and that pastel shadings were deemed most- and dark shadings least appropriate across all the 27 organizations. Clearly, the bright, saturated yellow colour which dominated the abovementioned web site did not fare well in this assessment. Thus, a dislike for the actual colours used may also account for the low satisfaction ratings obtained in the local Government experiment.

Studying colour is very tricky: it is difficult to measure wavelengths accurately; colours change under different lighting conditions; controlling for brightness and saturation is almost impossible, and one has no control over the appearance of colour on a computer monitor. Furthermore, we know little about perceptual colour constancy across people and across different age groups, in part because our colour vocabulary is quite impoverished making it

impossible to describe colour nuances accurately and in part because there are sizeable individual differences in colour preferences. Still, colour *is* a salient stimulus, and we are pursuing the issue, investigating the extent to which colour may influence subsequent judgments in a series of current experiments. In these, colour combinations judged independently to vary in pleasantness are used to prime participants in one condition in which the task is to judge the likeability of a number of persons described in short vignettes. The vignettes contain strong positive and negative personality traits that are manipulated systematically in a factorial manner. One would expect the least liked colours to yield lower likeability ratings than the same vignettes judged in the control condition without colour priming, assuming, of course, that this negative effect outlasts the stimulus display. It is clearly not possible as yet unequivocally to determine the impact of colour on the interactive experience.

The Link between Perceived Usability and User Satisfaction

A pleasant experience such as viewing or navigating a 'beautiful' web site has been shown in several studies to be intrinsically connected to user satisfaction (Buxton 2005; Lindgaard & Dudek 2002;2003; Tractinsky & Zmiri 2006). However, in the ISO 9241-11 Standard (ISO 1997) 'user satisfaction' is referred to in terms of 'attitude' and 'degree of comfort' and measured by a number on a 7- or 10-point scale. None of these terms capture the user experience which, one may argue, culminates in higher or lower satisfaction. Traditional satisfaction measures also fail to point to particular user interface issues that could help the web designer understand how to improve her design. In order to achieve this, it is necessary to identify the factors that contribute to user satisfaction; this could shed light on the reason(s) for the low satisfaction ratings obtained in the local Government experiment described earlier. A series of experiments aiming to learn more about the components of user satisfaction was therefore performed in our lab. The paradigm was similar to that employed in the control group in the local Government experiment. Participants were asked to browse a web site for 10 minutes, encouraged to verbalize their experience as they went as well as being interviewed and rating a set of interaction-related statements at the end of the 10 minutes. Thereafter, they were either excused or asked to complete a usability test on the same site; they were then interviewed again at the end of the usability test and asked to respond to the same statements as before. The audio taped sessions enabled us to collect roughly 3,500 experience-related spontaneous statements that were then sorted into five categories, namely aesthetics, emotion, likeability, expectation, and usability.

Our operational definitions of these five concepts were adequate for sorting participants' statements unambiguously, but some of them shared similarities that made us suspect they would not stand up to more detailed scrutiny. The notion, for example, of likeability is probably a consequence of visual appeal: if it is pretty, I like it, if not I don't. Another series of experiments was therefore performed, aiming to derive and validate a user satisfaction scale that would point a web designer to issues that, if modified, could improve the interactive experience with their product. This work is currently being written up for publication.

Among the web sites used in all of these experiments, one stood out as being exceedingly beautiful and also completely unusable, as confirmed in the usability test (Lindgaard & Dudek 2002). The results showed that, even before attempting to complete the usability tasks, participants knew very well that the site was not usable, but this did not detract from its high visual appeal. After the usability test, negative usability-related statements increased considerably, and judgments of perceived usability were even lower than before the test. Judgments of visual appeal, however, remained as high in the second- as in the first half of

the experiment. A similar finding was recently reported in a study involving four MP3 player skins in which one that was reasonably low in usability but very appealing was preferred over another that scored higher on usability but lower on aesthetics (Mahlke 2006). Findings such as these suggest that perceived usability and visual appeal are judged independently of one another, a finding that contradicts some researchers' claim that "what is beautiful is [*perceived to be*] usable" (Tractinsky, Katz & Ikar 2000). This independence of visual appeal and perceived usability was again confirmed in a more recent experiment in which participants rated perceived usability, visual appeal, and trustworthiness of a set of homepages. The results of that experiment, which is currently being written up for publication, suggest that individuals' internal criteria for judging trust and usability are stable, but that the judgmental criteria differ between people. That is, each person's ratings of all three, usability, trust, and visual appeal, were highly reliable from one occasion to the next, but the criteria on which their judgments relied differed considerably from one person to the next.

Interestingly, the concept that Tractinsky now calls 'classical aesthetics' mostly refers to elements that are contained in both information design (Zwaga & Easterby 1984) and in screen design principles (for example Galitz 1981;1993). Adherence to these principles helps the user to detect, perceive, and interpret a particular stimulus as well as to act on it correctly. Basic principles borrowed from human perception are applied such as grouping items that belong together and separating groups that differ semantically from others, to lend the resulting screens an ordered impression that is consistent with users' expectations. If we accept that this orderliness is visually appealing and that it contributes to usability, then we are forced to accept Tractinsky et al.'s (2000) contention that what is beautiful *may be* usable. This argument again highlights the lack of an agreed-upon definition of aesthetics or even of usability for that matter. Buxton (2005) is probably right: the quality of the user experience is a combination of the perceived affordances and usability factors. The intensity, positive or negative, of the first impression is likely to set the scene for the amount of attention subsequently paid to experiential usability and pleasure-of-usage factors, which then culminate in that judgment of the experience that we might call user satisfaction.

Despite the fact that findings so far shed no light on the actual *criteria* by which people judge visual appeal or user satisfaction and trustworthiness, we can say that perceived usability is related to the detection of stumbling blocks that hinder smooth interaction with a web site and probably to the orderliness of screens. User satisfaction is a complex construct that incorporates several measurable concepts and is the culmination of the interactive user experience. People are sensitive to perceived usability problems but these have no impact on the visual appeal, and that apparently, visual appeal weighs more heavily in preference judgments than usability. It follows that people may be more satisfied with a beautiful product that performs sub-optimally than with a more usable but less appealing product.

Summary and Conclusion

We began by asking why people at an art exhibition tend to dwell very long before one painting and barely notice another. We then argued that aesthetics, although still subject to ambiguity in definition, plays a major role in determining how we feel about a given stimulus, and that a feeling is generated immediately upon detection of the stimulus. The first impression may or may not be modified with increasing usage of a product, and ultimately, we argued that user satisfaction is a judgment about the interactive experience with products including web sites.

Where does this take us and why should we care? One obvious advantage is the unpacking of the concept of user satisfaction. Traditionally, it has been measured by a single statement on some rating scale. For the product or web designer, a satisfaction rating of, say 58.5% does not help to decide how or where the site should be improved to increase the rating to whatever the preset usability goal demands. The sheer understanding that satisfaction involves more than utilitarian usability considerations in the head of the user is beneficial. Apparently, both the first impression and the pleasure associated with continued usage are at least as important as usability concerns. Thus, more effective resource allocation in web design, especially in e-commerce web design, is one positive and immediate outcome of that understanding.

Much of the research discussed in this paper suggests that the dichotomy between emotion and cognition is much less pronounced than traditional cognitive psychology would have us believe. If indeed the interpretation of our own physiological signals largely directs our selective search for further information, this suggests that emotion may play an important role in human performance that goes well beyond web design. One may speculate that interactive technology that “feels good” or “feels right” will put the user at ease, or as Czickzenmihaley (2000) would say, the user would be “in flow” by balancing their knowledge, task skills and task demands with the design of the technology intended to support the user’s tasks. The result of this harmony is that the user feels in control even while executing very complex, cognitively taxing tasks. The flow state would maximize the amount of cognitive resources available to focus on the task. Consequently, the extent to which the technology draws negative attention to itself, it reduces those cognitive resources, which could lead to inferior user performance. In today’s world, knowledge workers are increasingly at liberty to define, evolve, and re-define their tasks, jobs, and roles. Interactive technology that supports and adapts to both the cognitive and the more emotion-based user requirements will assume increasing importance in the future workplace.

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