08292 Abstracts Collection
The Study of Visual Aesthetics in Human-Computer Interaction
— Dagstuhl Seminar —

Marc Hassenzahl[1], Gitte Lindgaard[2], Axel Platz[3] and Noam Tractinsky[4]

[1] Univ. Koblenz/Landau, D
hassenzahl@uni-landau.de
[2] Carleton University - Ottawa, CA
gitte_lindgaard@carleton.ca
[3] Siemens, München, D
axel.platz@siemens.com
[4] Ben Gurion University, IL
noamt@bgumail.bgu.ac.il

Abstract. From 13.07. to 16.07.2008, the Dagstuhl Seminar 08292 "The Study of Visual Aesthetics in Human-Computer Interaction" was held in the International Conference and Research Center (IBFI), Schloss Dagstuhl. During the seminar, several participants presented their current research, and ongoing work and open problems were discussed. Abstracts of the presentations given during the seminar as well as abstracts of seminar results and ideas are put together in this paper. The first section describes the seminar topics and goals in general. Links to extended abstracts or full papers are provided, if available.

Keywords. Human-computer interaction, aesthetics, beauty, design, hedonics, concepts, measurement

08292 Executive Summary – The Study of Visual Aesthetics in Human-Computer Interaction

This seminar explored various aspects of the study of visual aesthetics in human-computer interaction (HCI). The discussed issues relating to theory building, measurement issues, antecedents of aesthetic design and its consequences. We also identified a set of research challenges that this emerging field needs to discuss.

Keywords: Visual aesthetics, human-computer interaction, design, user experience

Joint work of: Hassenzahl, Marc; Lindgaard, Gitte; Platz, Axel; Tractinsky, Noam

Extended Abstract: http://drops.dagstuhl.de/opus/volltexte/2008/1626

The Role of Visual Aesthetics in Creating Initial Familiarity

Olav W. Bertelsen (Univ. of Aarhus, DK)

In the presentation I focussed on how users can be enabled to develop their computer use during use. Within human activity theory, it can be argued that development in use can be supported by designing for a zone of proximal development and that initial familiarity is central in creating this zone. Creating initial familiarity can be done by basing interaction on existing experience and competence, but when that is not possible the aesthetic aspects of the interface can be used to provoke the user, make the user feel safe, and to communicate to the user what is possible to do with the system. This was exemplified with a recent study of the relation between first impression and perceived usability, and by an example of how constellations of software, appeared to have materiality and how interface metaphors were systematically broken when used by techno composers. In the later case the important insight was that interface tropes that are more open to continued development than was the metaphor is needed. Thus, isolated visual aesthetics does make sense as communicative devise in the interface, but in order to support development in use a dedicated aesthetic theory of interactive everyday artefacts is needed. I argued an aesthetic perspective on HCI should integrated and non-parametrized.

Keywords: Initial familiarity, aesthetics, interaction design

The effect of brand on the perception of web-sites aesthetics

Antonella De Angeli (Univ. of Manchester, GB)

A brand can be a name, a logo, and/or a packaging style which uniquely identifies a product or a service and differentiate them from their competitors. A good brand communicates product superiority to consumers, thus increasing their perceived value. In the marketing literature, this increased value is known as brand equity, i.e. a set of intrinsic product attributes related to perceived quality and knowledge of a brand. From a customer-based perspective, brand equity refers to a general predisposition towards a brand composed of brand loyalty, name awareness, perceived quality and brand association.

The effect of brand on consumer preferences for real and virtual goods and/or services is largely documented in consumer psychology and marketing. Yet, with the exception of studies of trust and the emerging field of captology, this effect has attracted scarce attention from the HCI community. This paper will present results from two unpublished studies showing that brand plays a major role on the way people perceive and evaluate web-sites. In particular, brand seems to be an influential factor affecting the evaluation of the web-site aesthetics.

Joint work of: De Angeli, Antonella; Hartmann, Jan; Sutcliffe, Alistair

The Beauty Dilemma

Sarah Diefenbach (Univ. Koblenz/Landau, DE)

Many researchers and practitioners of Human-Computer interaction (HCI) acknowledge the idea that it needs more than usability and usefulness to design truly pleasurable experiences with products. Certainly, usability is needed, but the users' desires go beyond the prevention of the negative, such as problems and failures - they seek for the positive, pleasurable, stimulating and inspiring experience. This calls for a shift from the mere task accomplishment to the users' needs and aspirations, their Self. Especially the role of beauty gains more and more interest as its importance for the users' product valuation has been recognized. Unfortunately, it is not that easy to accomplish the enrichment of the users experience by adding beauty: although beauty is appreciated while product use, it often is disregarded while product choice. The present paper's objective is to point out the dilemma that arises when beauty meets technology in a choice situation.

Keywords: Beauty Dilemma, Lay Rationalism, Justification

Joint work of: Diefenbach, Sarah; Hassenzahl, Marc

Full Paper: http://drops.dagstuhl.de/opus/volltexte/2008/1622

If it is Beautiful, We Should Trust It: Practical Implications of Studying the Relation of Appeal to Distrust in Web Sites

Cathy Dudek (Carleton University - Ottawa, CA)

The relation between appeal and trust in web sites is complicated and quite poorly understood. One feasible way to better understand this relationship is that researchers should consider exploring the relation between appeal and distrust as well as appeal and trust. Appeal judgments appear to be driven mostly by emotion (e.g. Lindgaard, Dudek & Sen, 2008), whereas trust has both a cognitive (belief) and an affective (value) component (Jarvenpaa, Knoll & Leidner, 1998; McAllister, 1995; Sitkin & Roth, 1993). When people trust someone, they make a cognitive assessment (i.e., they expect a positive or a good outcome) (e.g., Bhattacharya, Devinney & Pillutla, 1998; Deutsch, 1973; Rouseau, Sitkin, Burt & Camerer, 1998). The outcome could be negative, but the expectation is that it will be positive. This expectation is associated with an emotion called hope (Held, 1968, citing Locke; Lewicki, McAllister & Bies, 1998). Trust, therefore, can be conceptualized as a positive expectation coupled with the emotion of hope.

Some authors believe that trust and distrust represent two distinct concepts (for details see Lewicki, et al., 1998; McKnight & Chervany, 2001; McKnight, Kacmar & Choudhury, 2002; Sitkin & Roth, 1993). However, the underlying assumption is the same: trust involves an optimistic, and distrust a pessimistic, attitude. Whereas trust is thus the belief that someone will do something good for you, distrust is the belief that someone will do you harm. Thus, when people distrust, they expect a negative or unfavourable outcome (McKnight & Chervany, 2001), which is a cognitive assessment. Distrust is usually accompanied by the emotion of fear (Held, 1968; Insko, Kirchner, Pinter, Efaw & Wildschut, 2005; Lewicki, et al., 1998).

PeoplesŠ attitudes towards the concept of trust differ (Rotter, 1967), but most are predisposed to trust rather than to distrust (Baier, 1986; Bateson, 2000). This suggests that trust is the norm. If emotion changes peoples' attitudes, then an otherwise normal attitude of trust may change to distrust especially when fear is experienced. Emotion may indeed play a bigger role in signaling distrust than trust (e.g. McAllister, 1995; Sitkin & Roth, 1995). This is possibly because distrust is associated with perceived differences in values, whereas, trust is mostly associated with beliefs about performance (Sitkin & Roth, 1993). Sitkin and Roth (1993) claim that when commitments are not fulfilled in a trust relationship, and the failure is attributed to insufficient task performance, then trust decreases. However, if failure is attributed to a perceived moral deficiency of the trusted person, then distrust occurs, indicating that trust and distrust are fundamentally distinct concepts with differing antecedents. For Sitkin and Roth (1993), trust appears to be similar to McAllister's (1995) cognition-based version of trust because both are based on performance expectations. Distrust is similar to McAllister's (1995) affect-based trust because both are associated with the alignment of values. Because they could be distinct concepts, they warrant separate investigation. In this paper we describe how appeal, may be more associated with distrust than with trust because distrust, like appeal, may be guided primarily by emotive processes.

Joint work of: Dudek, Cathy; Lindgaard, Gitte; Sen, Devjani

Software aesthetics: from text and diagrams to interactive spaces

Paul A. Fishwick (University of Florida, US)

Ubiquitous computing suggests that the computers and their information are located everywhere - inside walls, rooms, people and trees.

A complementary scenario occurs along the virtuality continuum, where scripts and data are located separately in virtual 3D objects. A natural consequence of ubiquitous computing in physical and virtual environments is that information and software begin to transition from ethereal artefact to design object.

Currently, this trend is being seen in ambient devices that display information.

We describe how this trend will also lead to other forms of software being similarly expressed in a variety of human-interactive forms. The end result is a new vision for software representation that brings it into the public sphere.

Keywords: Aesthetic computing, information aesthetics, information visualisation, software aesthetics

See also: Fishwick, P. Software Aesthetics: from text and diagrams to interactive spaces, Int. J. of Arts and Technology, 1(1), 2008, in press.

Product Aesthetics

Paul Hekkert (TU Delft, NL)

In 2003, Lidwell, Holden and Butler published a well-documented collection of 100 universal principles of design. Among these are 28 principles explaining 'How can I increase the appeal of a design?' These principles, laws, or guidelines deal with the Golden Ratio, similarity, savannah preference, symmetry and color; principles that will also appear in this chapter. Most of these principles have for centuries been applied in the arts, and have over the last century been uncovered and tested in psychological experiments. The authors claim that the application of such principles increases the probability that a design will be successful' (Lidwell et aI., 2003, p. 11). We are tempted to adopt this claim, but want to take it a little further. Understanding why people are aesthetically attracted to some properties or patterns over others will support designers to make founded decisions on the attractiveness of their design. Over the past ten years, the first author has given many lectures on visual aesthetics to students of industrial design. The main message of these lectures always was: People may and do differ extensively in their aesthetic reactions to objects; these reactions as well as the differences are not arbitrary, but lawful. Contrary to what the popular expression 'de gustibus non est disputandum' holds, there is accounting for taste! Does this mean we can (already) explain all varieties in aesthetic preference? Of course we cannot. There are still many unresolved issues and unpredicted (but not unpredictable) exceptions . But, after more than 100 years of theorizing and experimentation, we have come to understand quite a bit about the drivers of people's aesthetic responses to the things around us in general and designed artifacts in particular. This chapter aims to bring together these insights.

Joint work of: Hekkert, Paul; Leder, Helmut

See also: Hekkert, P. & Leder, H. (2007): Product Aesthetics. In H. N. J. Schifferstein & P. Hekkert (Eds.), Product Experience, 259-283. Elsevier

Bridging the Arts and Sciences: A Framework for the Psychology of Aesthetics

Thomas Jacobsen (Universität Leipzig, DE)

The investigation of aesthetic processing has constituted a longstanding tradition in experimental psychology, of which experimental aesthetics is the second-oldest branch. The status of this psychology of aesthetics, the science of aesthetic processing, is briefly reviewed here. Building on this heritage and drawing on a host of related scientific disciplines, a framework for a strongly interdisciplinary psychology of aesthetics is proposed. It is argued that the topic can be fruitfully approached from at least seven different perspectives, each with multiple levels of analysis: diachronia, ipsichronia, mind, body, content, person and situation. Eventually, this work may coalesce into a unified theory of aesthetic processing.

See also: Jacobsen, T. (2006): Bridging the Arts and Sciences: A Framework for the Psychology of Aesthetics. Leonardo, 39 (2), 155-162.

Five things I believe about the aesthetics of interaction design

Jonas Löwgren (Malmö University, SE)

1. It makes little sense to talk about "visual aesthetics" as an isolated modality.
2. The genre determines the aesthetic qualities.
3. Aesthetic is not equal to good, pleasant, pretty, or nice.
4. Aesthetic experience is connected with intellectual deliberation as much as with immediate, "visceral" response.
5. We need holistic, interpretative approaches to dealing with aesthetics in interaction design.

These five beliefs are introduced and substantiated by means of examples and argumentation.

Keywords: Aesthetics, interaction design

Full Paper: http://drops.dagstuhl.de/opus/volltexte/2008/1623

Visual aesthetics and the user experience

Sascha Mahlke (TU Berlin, DE)

User experience is conceptualized as a phenomenon consisting of instrumental and non-instrumental quality perceptions as well as emotional user reactions. Visual aesthetics is defined as one non-instrumental quality and available methods are applied to measure the perception of visual aesthetics of interactive systems.

Selected results of two studies are reported that addressed the influence of perceived usability and visual aesthetics on emotional user reactions and consequences of user experience and studied the effect of user characteristics and contextual parameters on these relations. The results show that usability and visual aesthetics can be perceived independently. Furthermore, the relevance of perceived visual aesthetics for emotional user reactions and consequences of user experience is demonstrated. However, the results reveal that the importance depends on user characteristics, e.g. the centrality of visual product aesthetics, and context parameters, e.g. the goaldirectedness of the interaction.

Keywords: User experience, non-instrumental qualities, visual aesthetics, emotional user reactions

Full Paper: http://drops.dagstuhl.de/opus/volltexte/2008/1624

The relationship between beauty and perceived usability is wholly mediated by goodness

Andrew Monk (University of York, GB)

A variety of studies have reported correlations between ratings of beauty and ratings of perceived usability ranging from .92 to .00. This may be due to methodological inconsistencies. This paper will propose a methodology capable of providing a more definitive characterisation of the strength of this relationship. The method requires that participants and products be treated similarly. It is standard practice to specify the pool from which participants are drawn (e.g., undergraduate volunteers from such and such a university) and then make a case that the sample is representative of this pool because they are sampled randomly or exhaustively. One should similarly specify the pool from which products are sampled (e.g., health oriented websites) and then sample randomly or exhaustively from that pool. An analysis that aggregates ratings across products and has participants as sampling units is referred to as a subjects analysis. An analysis that aggregates ratings across participants and has product as the sampling unit is referred to as a materials analysis. To claim that a particular pattern of correlations is reliable it must be demonstrated in both subjects and materials analyses. The former demonstrates that the results apply across the defined participant pool and the latter across the product pool.

Two data sets were analysed. For Set 1, 60 participants rated 10 e-commerce websites and ratings were averaged across sites to give a set of scores for 60 participants (subjects analysis). For Set 2, 10 participants rated 60 e-commerce websites and ratings were averaged across participants to give a set of scores for 60 websites (materials analysis). In both cases bivariate correlations between beauty and usability were positive but low. Correlations between beauty and goodness were moderate (subjects analysis) or high (materials analysis). A mediation analysis shows that what correlation there is between beauty and usability is wholly accounted for by the indirect effect of goodness.

An inference perspective on quality perceptions and judgment is developed suggesting that when users are unable to judge usability directly they infer it from goodness which is highly influenced by more rapidly judged attributes such as presentation. This is not found to be the case for another judged product characteristic, that is, hedonic product character where there is a stronger and demonstrably direct correlation.

Keywords: Beauty, usability, mediation analysis, materials analysis

Joint work of: Monk, Andrew; Hassenzahl, Marc

On the impossibility of avoiding aesthetics in human-computer interaction

Frieder Nake (Universität Bremen, DE)

The simple and almost trivial argument of this talk can be summarized like this.

- Human-computer interaction (HCI) is a human action making use of computers (which means, making use of machinery called software).
- This action involves operations carried out by the computer. They appear to us as if the computer was also active (which in a way, it is).
- The human and the computer are constantly taking turns in their action and operation and, therefore, we call this entire happening "interaction".
- Since interactive use of the computer by necessity requires sensory perception and, consequentially, interpretation, aesthetics must play an important role. This is so if we consider aesthetics as the study of sensory perception and understanding.

Nothing in the world is true nor good nor beautiful. It is only through human judgment that layers of truth or goodness or beauty are generated. This is by three kinds of judgments: the logic, the ethic, and the aesthetic kind of judgment. So aesthetrics is, first of all, a way of making judgments. In so far, it is relational. It is not about features and properties of things.

The aesthetic judgment discriminates at the sensory level but it possesses the innate tendency of going beyond the sensory domain. So in the aesthetic judgment, we have discrimination and valuation. Valuation is definitely different from evaluation: it is about qualities, whereas evaluation may result in quantity and, in fact, much research aims at this.

The subject matter of aesthetics before valuation thus appears as human sensory perception as a component of semiosis, i.e. as the start into a sign process: a process of interpretation and re-interpretation, essentially without end. Visual aesthetics has ist subject matter reduced to the visual case.

Until recently, usability was a great concern within the HCI community. It is not possible to seriously compare aesthetics to usability unless we destroy aesthetics to some sort of instrument. It may, however be justified to identify

a few features of usability vs. Aesthetics. To usability, the computer is like a tool; only in an environment of work activity does usability make sense; here we have tasks and immediate purposes and, therefore, prediction and measure; in general, usability is a matter of practical reason.

To aesthetics, the computer is like a medium; it becomes important in game activities; decision making and values are guiding principles; and aestheics is a matter of contemplative reason.

As a general concept, I want to remind of software objects as algorithmic signs. These are signs that allow for, and require two interpretants: the intentional and the causal interpretant. Algorithmic signs are perceivable (by us) and computable (by the computer). They connect the aesthetic with the algorithmic domain. They have, metaphorically speaking, a surface and a subface.

As a radically agnostic position, I view the world as the world and nothing else. It is the whole that some call "god". We can have it in parts only. From a particular (sic!) perspective, the aesthetic perspective, e.g., the world appears as aesthetic signs, aesthetic processes, and aesthetic judgments. Since the aesthetic perspective is the perspective of perception, HCI has no choice but turn to aesthetics in its attempt to better understand certain processes.

HCI, in my view, is the weak coupling of two semiotic processes, one of them a full-fledged sign process (on behalf of the human), the other one reduced to a signal process (on behalf of the computer). Therefore, the (visual) aesthetics of HCI is the aesthetics of algorithmic signs as they appear in environments of interaction.

Questions of HCI must be tackled from here, i.e. from the dialectics of the newly discovered sign class, the algorithmic sign. The designer can manipulate the subface of the algorithmic sign. He has no influence on the surface except for the most trivial projection to the display screen. He can, however, make great use of the algorithmic side of the algorithmic sign.

This new challenge for aesthetics is what HCI is about. It may be the case that my plea for a radical aesthetic turn in HCI is off the main orientation of experimental psychology as a kind of normal science (Thomas Kuhn) exploring quantitatively what aesthetics may have to offer. In that case I apologize for an intervention whose basis is design more than analysis.

Extended Abstract: http://drops.dagstuhl.de/opus/volltexte/2008/1625

Visual Aesthetics and Task Performance

Helen C. Purchase (University of Glasgow, GB)

Much work has been done on aesthetic perception of interfaces, perception of usability, and the relationship between aesthetics and perceived usability. The pilot project described here focuses on task performance, investigating whether there is any relationship between aesthetic features and users' performance in word-creation tasks. In each task, experimental participants were presented with

nine letters and asked to create as many valid words as they could from these letters.

The aesthetic features investigated include colour, shape, font and layout; they (and their conditions) are all, as much as possible, related to what is known about perceptual processes from the psychology literature. The letter-sets used for the tasks were carefully chosen so as to ensure comparable difficulty with respect to the 12Dicts package of common English words.

Pre- and post-task preference data has also been collected. The data has not yet been fully analysed, and this talk will present what we have found so far (hot-off-the-press!)

Keywords: Aesthetics, Task Performance

Joint work of: Purchase, Helen C.; Simmons, D.

The Impact Of Prototypicality During First Impressions: Towards A Better Understanding Of Affective And Cognitive Components During Aesthetic Perception

Devjani Sen (Carleton Univ. - Ottawa, CA)

The aesthetics literature suggests that people are able to decide very quickly and reliably how much they like a particular stimulus (Lindgaard, Fernandes, Dudek, & Brown, 2005; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006). Likewise, studies suggest that prototypical stimuli are more appealing than non-prototypical stimuli (Fehr and Russel, 1984; Ritterfield, 2002; Uyeda and Mandler, 1980; Winkielman, Halberstadt, Fazendiero & Catty, 2006). In consideration of this body of literature, the current paper contributes to the cognitive-affective debate within visual aesthetics by testing one aspect of WhitfieldŠs Categorical Motivational Model which posits that aesthetics fulfils an information processing function through its link with the categorization of prototypical stimuli. This will be done by testing for the existence of a prototypicality/appeal relationship using visual stimuli that vary in level of prototypicality in three different exposure conditions. These exposure times were developed to differentiate between more affective (physiological based) and more reflective (cognitively based) responses. The mere exposure effect (Bornstein, 1989; Zajonc, 1980; 2001) has been shown to strengthen with an increase in the number of exposures of a given stimulus, suggesting that it is, in effect, based on 'familiarity' even though participants may not be aware of having seen a given stimulus before. If it is true that preference, and hence appeal, increases with additional viewing time, it is reasonable to expect that a longer viewing time might serve to increase appeal ratings also.

Joint work of: Sen, Devjani; Lindgaard, Gitte

Towards a theory of design quality judgement (including aesthetics)

Alistair G. Sutcliffe (Univ. of Manchester, GB)

The quest is to develop a predictive theory that specifies how people make quality judgements about IT related products. We know from several experiments and empirical studies that judgement is context dependent and it is influenced by the users' task and their prior knowledge. We have elaborated Adaptive Decision Making theory with judgement criteria (usability, content/services, aesthetics, customisation, engagement and brand) which are prioritised according to the decision domain and users' background. These criteria then control the decision making process, e.g. for entertainment applications, aesthetics and engagement will dominate, whereas for business oriented domains, content, services and brand will be more important. The criteria change over time as experience with the product accumulates, so aesthetics is important in early stages of product encounter, while engagement and functionality will dominate later on. The theory still needs considerable development to understand how different domains lead to prioritisation of criteria and how peoples' background interacts with expectations for different applications and domains.

Joint work of: Sutcliffe, Alistair G.; Hartmann, Jan; De Angeli, Antonella

Aesthetics of Mundane Interactions

Dhaval Vyas (University of Twente, NL)

Our everyday activities and interactions in the public and private settings often involve use of several heterogeneous media (physical and digital). We adapt, appropriate and even combine these different media to support our activities. The personal and ubiquitous technology push has made interactive products so 'unremarkable' that these products are gradually becoming a part of our everyday mundane lives. In other words, it would not be an exaggeration to say that ubiquitous technology push intentionally makes interactive technology a part of our mundane lives. Technologies that are used in domestic and office environments are the prime examples of this trend. However, there is a growing criticism about the notions such as seamlessness and disappearance within the ubiquitous computing applications for its narrow and deterministic focus. When computers had recognized and pre-specified tasks to follow, artificial intelligence techniques such as machine learning, computer vision or other pattern recognition techniques were a useful option. But when technology is becoming a part of people's everyday life, technologists need to understand the subtlety, fluidity and idiosyncratic nature of technology use. We believe that a thoughtful understanding of people's mundane life can provide several interesting implications about designing new ubiquitous technologies. Put simply, by understanding peopleŠs

mundane interactions as a first step could provide sociocultural and context-sensitive information for designing ubiquitous technology. To be able to explore and understand people's everyday mundane interactions we applied Dewey's insights of pragmatist aesthetics in practice. John Dewey's pragmatist aesthetics suggests that aesthetics of an experience cannot be seen as a collection of isolated and separate entities. It is a 'lived' reality and a coherent whole that is continuous and irreducible. Contradicting with the analytical approaches, pragmatist aesthetics suggests that by separating an aesthetic experience, our understanding of an 'experience as a whole' is distorted and impoverished. We used a conceptual framework to explore aesthetics of mundane social interactions of people in an academic work environment. The main purpose to do this was to explore and design possible technological solutions that can be sensitive to the social environment and everyday practices of staff-members. We used observations, contextual interviews and cultural probe methods to elicit staff-members experiences in their everyday lives. The qualitative data that was captured from the study indicate that aesthetics played an important role in interpersonal and instrumental aspects of staff-members' everyday life. Aesthetics was also prevalent in both physical and social spaces of the academic environment. We draw out several important implications to design new technologies that can support social interactions taking pragmatist aesthetics into account.

Full Paper: http://drops.dagstuhl.de/opus/volltexte/2008/1621