

# Aesthetics in Human-Computer Interaction

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## **1. Two Facets of Aesthetics**

Marc Hassenzahl's (2004) seminal paper on *The Interplay of Beauty, Goodness, and Usability of Interactive Products* has challenged the 'what is beautiful is usable and vice versa' stereotype. He has analyzed products in terms of hedonic and pragmatic attributes. Hedonic attributes are further classified in terms of those providing *stimulation* or *identification*. Based on the concepts of *stimulation* and *identification*, a number of non-utilitarian product attributes (such as satisfaction, pleasure, beauty or aesthetics) can be studied.

While *stimulation* concerns with novelty and 'fulfilling' challenges provided by product interfaces, *identification* relates to human need to express one's self through objects. Individuals want to be seen in specific ways by relevant others: using and possessing a product with specific aesthetic qualities is a means to their desired self-presentation. Further, judgment of beauty is a higher-level evaluative construct which is independent of actual product-usage experience; satisfaction and pleasure, on the other hand, are emotional consequences of goal-directed product usage. In other words, while issue of physical beauty mainly lies in the realm of *identification*, satisfaction and pleasure and other emotional attributes (aka aesthetics of use and interaction) relate to the issue of *stimulation*.

Social Scientist Mihaly Csikszentmihalyi (1975,) in his seminal study on happiness, has identified stimulation, novelty, and challenge as a fundamental human need for personal development (i.e., for proliferation of knowledge and development of skills.) While distinguishing between pleasure and enjoyment, Mihaly goes explains that optimal amount of challenge, coupled with necessary skills to deal with it, leads to a state of enjoyment, which he names *Flow*. Stressing on the importance of challenge in everyday mundane activities, he goes on to state that even gazing at a piece of art is also a form of challenge: "A lot of pieces that you deal with are very straightforward... and you don't find anything exciting about them, you know but there are other pieces that have some sort of challenge... those are the pieces that stay in your mind, that are the most interesting... Even the passive enjoyment one gets from looking at a painting or sculpture depends on the challenges that the work of art contains."

His argument about 'art as a challenge' can be thought about in terms of *stimulation* and challenge provided by product interfaces. We need to explore ways in which routine interface details (or the life activities it supports) can be transformed into personally meaningful activities that provide challenging yet optimal experiences. "Waiting at the dentist's office, for example, can become enjoyable provided one restructures the activity by providing goals, rules, and other elements of challenge the fulfillment of which ultimately leads to enjoyment."

Aesthetics, therefore, in our realm of inquiry, is of two forms: physical or visual aesthetics, and aesthetics of use or aesthetics of interaction.

### **1.1 Physical or Visual Aesthetics**

Physical beauty's property, as explained above, concerns product's ability to communicate favorable identity to others. This property makes beauty social, something to be shared, to be approved by others - a form of beauty that is not affected by usage experience. In light of this property of physical beauty, following hypotheses/ questions can be explored:

- Is beauty more relevant for personal preferences? E.g. Its relevance for My Phone vs. Public Phone
- Is beauty the driving force for becoming an owner of the product?
- Is beauty a prerequisite for a bonding between user and a product?
- Is beauty a potent purchase criterion if the product is used in social situations? E.g. Mobile phone, laptop, watches, etc.
- Do manufacturers explicitly consider beauty a product deliverable?
- How is beauty evaluated before product release?
- What place beauty has in the design process?
- How individuals and organizations use aesthetics to create, change or preserve their identity?
- What design principles are relevant for interface aesthetics?
- Does the aesthetic use of systems promote self-presentation of individuals (Tractinsky and Meyer 1999) or of organizations?
- How do organizations and industries use aesthetics in their IT systems to create value and to compete in increasingly crowded markets?

Noam Tractinsky, BJ Fogg, and Virginia Postrel, among others, have done substantial work in these areas to prove the importance of visual aesthetics to individuals, businesses and society at large. Patrick Jordan's concept of *Ideo Pleasure*, and Don Norman's concept of *Reflective level of design* concern this aspect of aesthetics.

### **1.2 Aesthetics of Interaction**

Aesthetics of use, or aesthetics of interaction, on the other hand, is a deep and hazy issue. It has been attempted by various researchers, many of whom have referred to it in terms of *stimulation* and challenge:

Michael Hammel in *The Aesthetics of Use* clarifies the misconception that hovers around aesthetics, namely that only attractive or (visually) beautiful is aesthetic. "Objects (or properties) that give good user-experience are not necessarily beautiful or pleasing, but it is the object (or property) that mediates the experience intended by the designer that makes the interface aesthetic." This mediating property is what coincides with Mihaly's and Hassenzahl's concepts of *stimulation* and challenge.

“The vision of aesthetic interface is to give the users experiences that derive from the users’ actual interaction with the artifact or computer-based product... The success of computer games industry and interactive art, as examples of good user experience, provides a good inspiration for the concept of aesthetic interface... These interfaces put themselves in the way of users. The experience they provide is to solve their puzzle, as they turn the whole of the computer into an interface that at the same time *is* the puzzle and means to solve it. In short, both the computer game and interactive artwork turn the computer into an aesthetic artifact, where you suddenly experience the interface as something that has an (meaningful) existence – or purpose – and that your interaction is meaningful in regard to the context as a whole... The experience of interactive artifacts, therefore, goes mainly through the actual interaction with the artifact... It is important to emphasize that people seek thrill and confirmation, but also are willing to accept risk if it is clear what is at stake, what gains and losses they might counter...”

Martin Christensen in *Introducing Excitability!* brings in the concept of *excitability* that again meshes with Mihaly’s and Hassenzahl’s concepts of *stimulation* and challenge. “Excitability can be defined as the ability to create and facilitate a certain amount of excitement in the use situation, eliciting emotional responses, critical senses or notable significant experiences. Excitability points towards the instances of some sort of affective “excess”, a surplus of meaning or action that arises in the use situation or from the use context. Excitability is occurring when there is *more* to the use situation than *just* use.” Talking about explicit focus of usability approaches to cut away unnecessary cues, affects and distractions, he argues that “excitability aims at pointing to those situations that offer experiences from a more ‘ambiguous’ outset for use situations. Excitability arrives from a position where not all options are given beforehand, where certain possibilities are yet uncovered, a situation where chances need to be taken. Where the object or the interface, not demands, but encourages or stimulates an affective investment from the user, entailing exactly and to a more ambiguous experience. Aesthetic experiences often are more affectively pronounced when deriving from unpredictable situations than from foreseeable obvious ones.”

In the same vein, in criticizing the narrow (usability) mindset of HCI, Hallnass & Redstrom suggest a philosophical approach to design. Envisioning the upcoming ubiquity of computational objects, they argue for seeking aesthetic ‘meaningfulness’ rather than for increasing productivity. “Meaningfulness does not arrive from efficiency, but appears when we have the possibility to *engage*, and to become excited and develop affectionate relationship beyond the functional aspects of usability.

These concepts of *flow*, *excitability*, *unpredictability*, *meaningfulness*, *stimulation*, *challenge*, *engagement*, among others seem to be hard and dense concepts to study. Understanding of the aesthetics of use looks like counter-usability, something like infinite number of ‘events’ that will unfold at the time of intermingling of the user and the activity on the interface, rather than ‘pre-planned’ or ‘designed’ experiences. Malcolm McCollough, in his recent book *Digital Ground*, tangentially ratifies this thought: “When conducted according to behaviorist notions, ‘experience design’ seems overly manipulative and culturally sterilizing. But when allowing for ‘unforeseen activities’, this latest stage in the trajectory of human-computer interaction has potential.”

“Invisibility or perhaps transparency is believed to be the primary goal for designers of technology, but in terms of relating to the technology as other, transparency, indeed invisibility, lacks the embodiment and the presence required for any real *engagement*. Engagement and attachment, like human-human relations, are the preconditions for trusting, lasting, pleasurable and rich interactions. This, arguably with some proviso, is also the case with human-technology relations.”

“To ensure that the life-like entity (i.e. ubiquitous computing environment) becomes someone (/thing) that affords attachment; I believe that aesthetics, the aesthetics of presence, of embodiment, are central concerns to take up.”

“Consider technological objects to have three properties in terms of its relation to the human subject: a functional, a semiotic and a material. Firstly, an object has some kind of function, it relates the subject to the user, promising the fulfillment of a task. The relation here is one of *instrumentality*. Secondly, an object has *semiotic* property, a signaling of some kind of culturally embedded meaning, a style or a certain characteristic. The relation here is one of expressing. Thirdly, an object has certain *materiality*, a certain way of being. The relation here is one of experiencing. While traditional engineering approaches have favored the cultivation of the instrumental relations, marketing and product-design approaches have generally cultivated the second. The third property of objects could be said to be closer to the concerns of aesthetics, and could arguably become one primary concern for interaction design.”

“In this sense materiality is the property that engages attachment rather than distance or transparency and arguably also a property that engages the human *affective* apparatus. Materiality, and hence potentially attachment, requires engagement with the object, whether it be a physical object or an interface representation.”

Finally, the most eloquent authority on the subject of *Emotional Design*, Don Norman’s views tend to coincide with all of what is explained in the context of aesthetics of interaction. After elaborating on the three levels of design, he talks about fun and games. “How can we maintain excitement, interest, and aesthetic pleasure for a lifetime? Music, literature, and art are rich and deep and there is something different to be perceived on each experience. In classic music, for example, the longevity derives from the richness and the complexity of its structure. The music interleaves multiple themes and variations. Human attention is limited, so it can attend only a limited subset of musical relationships at a given time.” In the context of aesthetics of design, it has two implications: “Object must be rich and complex, one that gives rise to infinite, never-ending interplay among the elements. Second, the viewer must study, analyze, and consider such rich interplay.” He further quotes Khalasvsky and Shedroff’s analysis of the properties of what they call *seductive* interfaces (which are also a candidate for design heuristics or testable hypotheses):

Does the interface

- Entice by diverting attention?

- Deliver surprising novelty (unusual enough to be intriguing, even surprising when it first becomes clear)?
- Go beyond obvious needs and expectations?
- Create an instinctive response (curiosity, confusion, perhaps, fear)?
- Espouses values or connections to personal goals?
- Leads the viewer to discover something deeper about experience?

Having discussed above points, Norman goes on to discuss Hollywood movies and video games and attributes their success to their ability to create what Mihaly terms *Flow*.

## **2. Art History, Aesthetics and Interface Design**

The concept of aesthetics, as the philosophy of sensations, is knit tightly together with the History of Art, both building upon earlier attempts to describe the good and proper way to produce works for appreciation. In the earliest History of Art, the emphasis was on creating the most life-like painting. Such lifelike paintings deceived the viewers as they were unable to distinguish the real from the painting. This is referred to in the Art History as *Realism* or *Naturalism*.

In the days of early computing, the 1940s and 1950s artists were heading in the direction of what was called as *Abstract Expressionism*. In the word of New York art critic Clement Greenberg, “Emphasize on the medium and its difficulties, and the purely plastic values of painting will come to the fore.” In other words, the interpretive emphasis in these paintings was laid on the materials and what an artist had done to them.

In the context of modern interface design, Art History can be used to point at the difference between the representation (i.e. looking at) and the represented (i.e. looking through). While realist paintings invited appreciation merely by looking at, abstract paintings were judged only on being able to look through them.

Excitingly, ‘Looking at’ or *realism* is synonymous to the concept of *Transparency* in Usability, and ‘Looking through’ or *abstractionism* epitomizes the concepts of challenge and *stimulation* described above in the context of aesthetics of interaction.

Soren Pold in *Material Matters* says that “there has been a strong belief in HCI that the computer should not get into the way, but that the interface should be invisible or transparent. In today’s media-realistic notion, however, interface should not be invisible, but an actor in the mesh of complex task reality.” This re-enforces the view that too much focus on Usability actually takes the interface far from aesthetics. Transparency and Usability in fact collide with the concept of stimulating interface (again negating the ‘what is beautiful is usable and vice versa’ stereotype.) Usability is of course important, but over emphasis on usability should not make the interface dull and boring.

### **3. Other Related Concepts**

- Aesthetics and Instrumentality *by Marianne Petersen*
- Aesthetics in the historical and socio-cultural context *by Marianne Petersen*
- Form and Expression *by Lars Hallnas*
- Aesthetics and Emotions *by Don Norman and by Pieter Desmet*

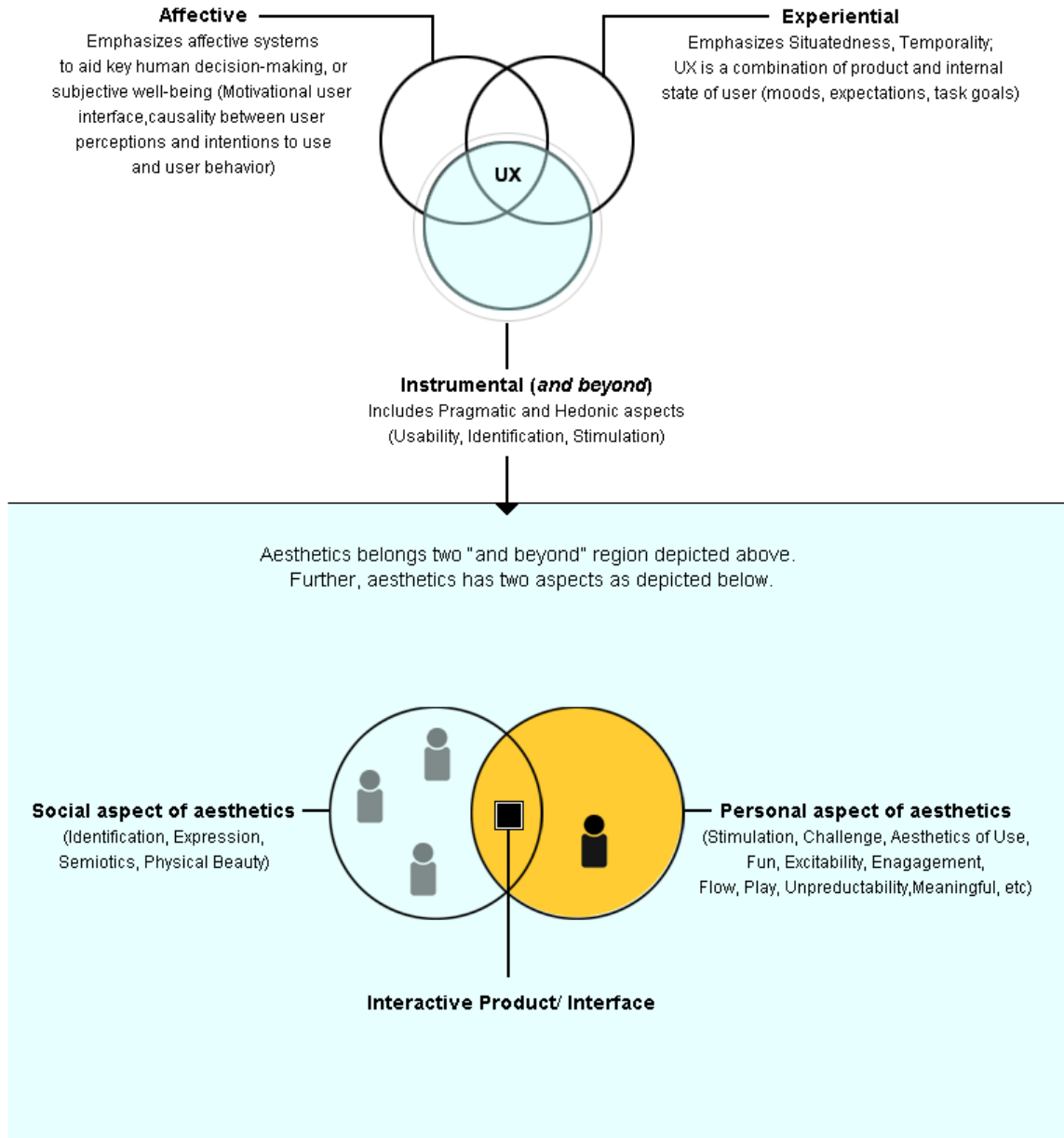
### **4. Possible Research Hypotheses in the Realm of Aesthetics of Use**

Aesthetic considerations should eventually be translated into actual blueprints for design activities. In the current scenario, HCI success criteria are often chosen valid if they are measurable and accounted for by quantifiable sets of data such as time used, tasks completed etc. Aesthetics of use might respond to other aspects of use situation, as to:

- *Why* users would want to be stimulated rather than being occupied with specific outcomes of their use.
- *What* factors are implicit in the use situation, not accounted for by usability measures?
- Instead of asking whether the interface is learnable, we could ask if the interface is *memorable, tillable, fun, or joy* (or other such subjective measures?)

Similarly, where usability tells us system is easy to use, we might want to measure whether system is *inspiring* or *challenging* to use. Also, rather than having goals of making interaction conventional, predictable, and easy to use, we might strive for making them *surprising, varied*, of course in addition to usual usability goals.

Figure 1: Three facets of User Experience (UX), and two facets of aesthetics



*Table 1: Aesthetics research across the world*

No.	Researcher(s)	Broad Research Work	Concepts/ Constructs
1.	Marc Hassenzahl	Human-Computer Interaction Research, (Special topics on Beauty)	<i>Stimulation, Challenge, Identification, Evocation</i>
2.	Noam Tractinsky		<i>Satisfaction, Pleasure</i>
3.	David Frohlich		
4.	Kees Overbeeke	Broader Interaction Design Research	<i>Enchantment, Meaningful Mediation, Valence, Arousal, Urgency</i>
5.	Stephan Wensveen		<i>Enchantment, Meaningful Mediation, Valence, Arousal, Urgency</i>
6.	CCM Hummels		
7.	Pieter Desmet	Emotion and Design	<i>Measuring Emotions: PrEmo (Product Emotion Measurement Instrument)</i>
8.	Donald Norman		<i>Visceral, Behavioral, Reflective</i>
9.	Patrick Jordan		<i>Physio Pleasure, Socio Pleasure, Psycho Pleasure, Ideo Pleasure</i>
10.	Mads Bodker	Aesthetic Approaches to Human-Computer Interaction Proceedings of the NordiCHI 2004 Workshop	<i>Phenomenology, Relational Ontologies (units that come into being in human engagement,) Transparency vs. Technology as other, Engagement, Aesthetics of Attachment, Punctuation, Presence, Friction, Dynamics</i>
11.	Giulio Jacucci		<i>Performance (potential of user such as in guitar or piano), Performance as an expression and individuality, Identification, Semiotics</i>
12.	Lars Hallnas		<i>Issues of Form and Expression, Design as a serial (temporal) form, design of functionality vs. design of use, infinite events folding, how a user relates function and interaction to each other</i>
13.	Soren Pold		<i>Transparency vs. Opacity, Realism Vs Abstract Naturalism, Looking at vs. Looking through (Art History)</i>
14.	Michael Hammel		<i>Transparency vs. Opacity, Realism Vs Abstract Naturalism, Looking at vs. Looking through (Art History) , Meaning, Challenge, Mental interaction</i>
15.	Martin Christensen		<i>Unpredictability, Excitability, Memorable, Tellable, Surprising, Varied, Ambiguous, Enigmatic, Enjoyable, Meaningful</i>
<b>Various Researchers Across the World</b>			
16.	Bill Gaver		
17.	Patrick Jordan		<i>Physio Pleasure, Socio Pleasure, Psycho Pleasure, Ideo Pleasure</i>
18.	Paul Rand		<i>Play, Chaos</i>

19.	George Nelson		
20.	Buckminster Fuller		
<b>Relevant Foundational Works</b>			
21.	Mihaly Csikszentmihalyi	Flow	<i>Happiness, Stimulation, Challenge, Flow</i>
22.	John Dewey	Art as Experience	
23.	George Santayana	Sense of Beauty	
24.	Donald Norman	Emotional Design	
25.	Virginia Postrel	Substance of Style	
26.	Patrick Jordan		
27.	Malcolm McCollough	Digital Ground	
28.	Steve Johnson	Interface Culture	
29.	Kenji Ekuan, David B Stewart	The Aesthetics of the Japanese Lunchbox	
30.	Del Coates	Watches tell more than time: Product Design, Information, and the Quest for Elegance	
31.	Jon Boorstein	Hollywood Eye: What makes movies work	
32.	Hiroshi Ishii		

### **Glossary of Constructs**

Stimulation  
 Identification  
 Satisfaction  
 Pleasure  
 Challenge  
 Novelty  
 Enjoyment  
 Reflective  
 Meaningfulness  
 Puzzling  
 Thrilling  
 Confirmation  
 Excitability  
 Ambiguous  
 Affective  
 Flow  
 Unpredictability  
 Engagement  
 Unforeseen activities  
 Infinite events

Emotional  
Seductive  
Transparency  
Instrumentality  
Realist  
Abstract Naturalist  
Inspiring  
Materiality  
Memorable  
Tell-able  
Enjoyable  
Evocative  
Semiotic  
Phenomenology  
Haptic  
Tangible  
Engaging  
Transparent  
Technology as other  
Form  
Expression  
Art History  
Evocative  
Attachment  
Enticing  
Discourse  
Dialogue  
Rhetoric  
Funology  
Embodiment  
Punctuation  
Presence  
Friction  
Dynamics  
Joy  
Surprise  
Diversion  
Intimacy  
Evocation (self-maintenance, memories)  
Ambient  
Affect  
Elegance  
Satisfaction

