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# Design for Intuitive Use: Beyond Usability

**Anja B. Naumann**

Deutsche Telekom Laboratories  
Berlin University of Technology  
Ernst-Reuter-Platz 7  
10587 Berlin, Germany  
anja.naumann@telekom.de

**Anna E. Pohlmeier**

Center of Human-Machine  
Systems, TU Berlin  
Franklinstr. 28-29  
10587 Berlin, Germany  
apo@zmms.tu-berlin.de

**Steffi Hußlein**

Interaction Design Lab  
University of Applied Sciences  
Potsdam  
Pappelallee 8-9  
14406 Potsdam, Germany  
husslein@fh-potsdam.de

**Martin Christof Kindsmüller**

Institute for Multimedia and  
Interactive Systems  
Ratzeburger Allee 160  
23538 Lübeck, Germany  
mck@imis.uni-luebeck.de

**Carsten Mohs**

HFC Human-Factors Consult GmbH  
Köpenicker Str. 325  
Haus 40  
12555 Berlin, Germany  
mohs@human-factors-consult.de

**Johann Habakuk Israel**

Center of Human-Machine Systems  
Berlin University of Technology  
Franklinstr. 28-29  
10587 Berlin, Germany  
johann.habakuk.israel@zmms.tu-berlin.de

**IUUI Research Group**

iuui@zmms.tu-berlin.de

**Abstract**

After a short introduction to our concept of intuitive use of user interfaces we would like to invite the interdisciplinary CHI community to discuss at least two important issues, namely: How does intuitive use and aesthetics relate? And, does physicality enable intuitive use? In the following, we present some provoking theses to trigger the discussion of these questions.

**Keywords**

Intuitive use, usability, aesthetics, physicality

**ACM Classification Keywords**

H.5.2 User Interfaces: User-centered design, theory and methods. H.1.2 User/Machine Systems: Human factors.

**Introduction: Intuitive Use**

The interdisciplinary IUUI research group (Intuitive Use of User Interfaces) as a team of psychologists, computer scientists, engineers, and designers, has made it its business to explore *intuitive use* as a well defined scientific concept. A first result has been the definition of the concept: "A technical system is, in the context of a certain task, intuitively usable while the particular user is able to interact effectively, not-consciously using previous knowledge" [11]. In a second step we are currently working on design criteria for intuitively usable systems and devices. Apart from general design

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principles for intuitive use [10], two important questions remain: What is the role of aesthetics? And, does physicality enable intuitive interaction? We would like to discuss these questions and try to find some answers towards possible design principles.

### **Perception of Aesthetics and Intuitive Use**

*What is usable is beautiful – or the other way around?*

Does it help to add an additional vague and ambiguous construct to our concept of intuitive use? Is aesthetic quality even a necessary precondition for intuitive use?

Leder et al. introduced a model of aesthetic processing which proposes two types of output: an aesthetic emotion and an aesthetic judgment [9]. The aesthetic experience is conceptualized in an information processing stage model: perception, implicit memory integration, explicit classification, cognitive mastering, and evaluation. The first two stages are subconscious in nature and highlight the potential of previous knowledge in the appreciation of art and design. Therefore, taking innate perceptual preferences (e.g. Gestalt Psychology) and familiar patterns, thus the basis of intuitive use, into consideration can result in a positive aesthetic evaluation. In contrast, hindered cognitive fluency disturbs the process and will likely lead to a less favourable evaluation. Norman's model of emotional design [13] goes one step further by including a behavioral level in addition to the visceral, both of which are claimed to be primarily subconscious. In other words, these two levels can be compared to the aesthetic experience outlined by Leder et al., but include the behavioral interaction of a user with a given system. Norman's reflective level on the other hand shows similarities to the output of an aesthetic judgment.

It would be shortsighted to expect everything familiar to be classified as aesthetically appealing. Hekkert et al. [5] highlight the importance of a carefully designed balance between typicality and novelty. A dual-process, which might be best summarized by the principle 'most advanced, yet acceptable' is proposed: typicality and novelty as joint predictors of aesthetic preference. Again, this could be seen in parallel to an aesthetic experience: intuitive use based on familiarity, might be the prerequisite for a positive output, which in addition to arousing novelty results in an overall aesthetic judgment. Depending on the context, one process might outweigh the importance of the other. For example, whereas novelty might be a stronger predictor in art, which is primarily intended to evoke aesthetic appreciation, typicality might be a more crucial aspect in time-sensitive situations where cognitive resources are limited. This is often the case with interactive systems.

While Creusen and Schoormans [1] define aesthetic value as the pleasure derived from seeing a product without consideration of its utility, Djajadiningrat and colleagues [3] suggest a shift in focus from beauty of mere appearance to the beauty in interaction. After all, interactive systems involve more facets than just the visual sense (e.g. tactile, acoustic). Moreover, in line with Hassenzahl's [4] differentiation, the concept of attractiveness should be subdivided in the higher-level evaluation of beauty, which is basically independent of a system's perceived usability, and the evaluation of goodness, which is related to instrumental qualities such as usability. Tractinsky et al. [17] evoked a discussion on the equation 'what is beautiful is usable'. They claimed a comparable relationship of perceived beauty and other inferred positive attributes in systems

as has been observed in social psychology for humans [2].

*From Aesthetics to Intuitive Use: Design Patterns*

One possible method of supporting the design process of intuitively usable interfaces for different user groups and usage situations is the description of interaction design patterns. These patterns integrate specific control devices, interaction cycles, and dialog modules for the design of user interfaces [16]. Each design pattern contains the description of a design problem with the corresponding solution and references to related patterns on higher and lower levels. Generic sets of interaction design patterns allow for a consistent and intuitive interaction logic for future applications.

A specific challenge when developing design patterns is the composition of so called *aesthetic patterns* which are able to address specific motivational and emotional user experiences (the *sensory user experience*). Jordan [8] emphasizes that particular emotional responses may be associated with particular types of *form language*. Based on well established design theories [18], via aesthetic patterns, efficient design principles can be formulated which imply all senses with their sensory perception potential. Aesthetic factors in their contextual sense act as retrieval cues for previous knowledge, because sensory steps and aesthetics judgements take place in the very beginning of the perception process. If none of the impressions is compatible with the previous experience, the user can not intuitively approach the device and its meaning.

So what are the conclusions? Is intuitive use a predictor for aesthetic appreciation? Or might the opposite hold true: a positive evaluation of an aesthetically appealing

system infers a positive bias on the judgement of intuitive use.

**Physicality, Tangible Interfaces and Intuitive Use**

As physicality is about to return in user interfaces [12] and tangible interfaces are more and more popular among interface designers [6], the question that drives us is whether physicality is a criterion that facilitates intuitive use per se. Various considerations which we like to discuss at the panel let us assume that physicality supports or even enables intuitive interaction.

In respect of Rasmussen's *internal dynamic world model* [14] it appears easier to simulate the interactive characteristics of physical objects than the behavior of complex GUI dialogues and menus. Because physical manipulation of the interface is frequently repeated and re-encoded, it occurs usually below the consciousness level and invokes, according to our definition, intuitive use. The material form of tangible interfaces allows for applying all kinds of engrained manual skills to the interaction with digital systems. Thus we assume that the solution of the *interaction problem* in tangible interfaces requires comparatively few cognitive resources and leaves more capacities for the solution of the main task, the *overall problem* [15].

The *syntax* of interaction in tangible interfaces is usually implicitly given by the physical coding and constraints of the interface. The user does not need to learn an explicit command-language and -syntax. Action and object, which are usually specified separately, are merged into joint interaction tokens. Thus the interaction alphabet reduces dramatically without losing functionality.

An often raised question whether intuitive interaction with tangible interfaces is possible only at the cost of less complex systems is still to be answered. We think that applying physical metaphors to user-interfaces may transfer user's engrained sensomotor skills to the manipulation of abstract data. This may help to advance from simple one-to-one mappings towards flexible tangible systems which are intuitive to use [7].

### Discussion

Some of the presented theses are controversially discussed within the IUUI research group and even among the authors of this proposal. Therefore we expect a lively discussion within the community at CHI2008.

### References

- [1] Creusen, M., Schoormans, J. The different roles of product appearance in consumer choice. *Journal of product innovation management*, 22 (2005), 63-81.
- [2] Dion, K., Berscheid, E., Walster, E. What is beautiful is good. *Journal of Personality and Social Psychology*, 24 (1972), 285-290.
- [3] Djajadiningrat, J.P., Overbeeke, C.J., Wensveen, S.A.G. Augmenting fun and beauty: A pamphlet. *Proc. DARE 2000*, ACM Press (2000), 131-134.
- [4] Hassenzahl, M. The Interplay of Beauty, Goodness, and Usability in Interactive Products. *Human-Computer Interaction*, 19 (2004), 319-349.
- [5] Hekkert, P., Snelders, D., van Wieringen, P.C. 'Most advanced, yet acceptable': typicality and novelty as joint predictors of aesthetic preference in industrial design. *British Journal of Psychology*, 94 (2003), 111-124.
- [6] Hoven, E.v.d., Frens, J., Aliakseyeu, D., Martens, J.-B., Overbeeke, K., Peters, P., Design Research & Tangible Interaction. *Proc. TEI'07*, ACM Press (2007), 109-115.
- [7] Hurtienne, J., Israel, J.H., Image schemas and their metaphorical extensions: intuitive patterns for tangible interaction. *Proc. TEI'07*, ACM Press (2007), 127-134.
- [8] Jordan, P.W. Human factors for pleasure in product use. *Applied Ergonomics* 29, 1 (1998), 25-33.
- [9] Leder, H., Belke, B., Oeberst, A., Augustin, D.A. model of aesthetic appreciation and aesthetic judgements. *British Journal of Psychology*, 95 (2004), 489-508.
- [10] Mohs, C., Hurtienne, J., Scholz, D., Rötting, M. Intuitivität - definierbar, beeinflussbar, überprüfbar. In *Useware 2006 - VDI Berichte Nr. 1946*. VDI-Verlag, Düsseldorf (2006), 215-224.
- [11] Naumann, A., Hurtienne, J., Israel, J.H., Mohs, C., Kindsmüller, M.C., Meyer, H.A., Husslein, S. Intuitive Use of User Interfaces: Defining a Vague Concept. In D. Harris (Ed. ). *Engineering Psychology and Cognitive Ergonomics, HCII 2007, Vol. 13*, Springer, Heidelberg (2007), 128-136.
- [12] Norman, D.A. The next UI breakthrough, part 2: physicality. *Interactions* 14, 4 (2007), 46-47.
- [13] Norman, D. A. *Emotional design: why we love (or hate) everyday things*. Basic Books, New York, 2004.
- [14] Rasmussen, J. *Information processing and human-machine interaction: An approach to cognitive engineering*. North-Holland, Amsterdam, 1986.
- [15] Streitz, N.A. Cognitive ergonomics: An approach for the design of user-oriented interactive systems. In Klix, F. and Wandke, H. (eds.) *MACINTER I*, North-Holland, Amsterdam, NL (1986), 21-33.
- [16] Tidwell, J. *Designing Interfaces: Patterns for Effective Interaction Design*. O'Reilly, Cambridge, 2006.
- [17] Tractinsky, N., Katz, A.S., Ikar, D. What is beautiful is usable. *Interacting with Computers* 13 (2000), 127-145.
- [18] Wertheimer, M. *Drei Abhandlungen zur Gestalttheorie*. Wissenschaftliche Buchgesellschaft, Darmstadt, 1967.