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## Aesthetic Concerns

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### Abstract

Aesthetics is a subject receiving increasing attention in the design of pervasive information systems. One reason is the realisation that existing approaches centred on usability and utility do not seem to cover aspects of use essential to the realm of the everyday. Another reason aesthetics enters the picture is that by leaving the established domain of personal computing, pervasive information technology comes in close contact with other design traditions engaged in the design of everyday things, and thus also a very different set of perspectives, values and approaches. As we position pervasive information systems in relation to design traditions such as architecture and industrial design, it becomes apparent that we often lack even a rudimentary understanding of the expressiveness and aesthetics of the technology we are working with.

This chapter attempts to raise aesthetics as an issue that needs to be addressed in pervasive information systems: the motivations behind it; examples of what is being proposed, and; a critical discussion of its prospects. By taking a broader look at some of the key issues, and what general development strategies are evident, the chapter tries to present, if not a coherent picture, then at least an illustration that there indeed is something of an aesthetics of pervasive information systems emerging.

### Keywords:

pervasive information systems, aesthetics, design theory, design methodology

### Introduction

While the expressiveness and aesthetics of information technology have been explored in art for quite some time now, it is more recently that these issues have entered the discourse of human-computer interaction and interaction design. A central reason for this increasing interest in aesthetic concerns seems to be the introduction of ideas such as *pervasive information systems*, *ubiquitous computing* and *ambient intelligence*.

A central reason that the notion of pervasive computing urges us to consider aesthetics is that it, as a rather radical alternative to personal computing, puts a certain focus on *how* we design things – ‘how’ meaning the concrete form that we give the things we design. By revisiting questions such as whether to use screen, keyboard, mouse, etc., we open up for alternative (re)solutions to the same functional requirements. An illustrative example of this, is the notion of *tangible user interfaces* (TUIs). The difference between such interfaces and the (by now traditional) *graphical user interfaces* (GUIs) is not so only a matter of what they do, but *how* they do it. While we can try to capture the difference between a given TUI and a GUI in terms of functions, what really sets them apart is how they appear in use, the expressions that define them.

Much of interaction design has been concerned with optimising this single path for speed and effectivity. Yet, it is exactly this repetition of a single, predictable path, time and time again, which, in the end, becomes a clear “aesthetics killer.” Therefore, we have become interested in products that offer a myriad ways of

interacting with them. Interaction in which there is room for a variety of orders and combinations of actions. Freedom of interaction also implies that the user can express herself in the interaction. (Djajadiningrat et al. 2004, p. 297)

Another reason aesthetics becomes important, is, of course, because pervasive technology is designed to be present in a world not designed around them – a world where the machine is not at the centre. Some time ago, the shift in computer design towards the office domain implied many changes to what was considered important and, as a result, we now typically interact with our computers in ways inspired, and valued, by the office and work context. The idea of pervasive information systems push computers even further into the realm of the everyday, a world dominated by other kinds of design traditions and values. To say that technology is becoming fashion is not only to say that technology now needs to “look good”; it is also to say that technology is now being appropriated on the basis of cultural heritage, social structures, use patterns, personal identities, etc., much like how we relate to other kinds of everyday things (cf. Aarts and Marzano 2003). This is potentially a more fundamental shift than the one towards office work as a basis for designing computational things.

Given the rather immature state of aesthetics in our field, a reasonable starting point for an enquiry into such issues would be to try to better understand what the role for, and relevance of, an aesthetic perspective could be like – and indeed, how one could go about developing one. To do so, we would probably have to say something about what an aesthetic perspective in general might be like, and if it differs from the understanding we currently have as we develop new technology on basis of practical functionality. The aim of this chapter is to examine a few such basic issues. Thus, some of what will follow might appear rather elementary to many, perhaps trivial to some. Yet, there is a need to revisit these basic questions, as there are fundamental differences between typical technological and aesthetic perspectives that are likely to cause us some confusion as we try to combine them. But let us start with the calls for aesthetics emerging in interaction design.

### **The Call for an Aesthetics of Pervasive Computing**

A common feature of arguments for taking aesthetical issues more seriously in the development of pervasive computing applications is that the shift towards everyday life implies certain differences compared to the professional work setting in which *personal computing* evolved. Such differences include that there is a different set of values to be sought after, e.g., engagement rather than efficiency, exploration rather than error-free performance, and so on. To optimise practical functionality with respect to utilitarian perspectives is not enough, or not even good at all (cf. Gaver and Martin 2000, Gaver et al 2004). Thus, aesthetics, and especially modern aesthetics with its rich framework for critique, may not only be used to expand the scope of technology development but also to critically examine it from within, i.e. through design (cf. Dunne 1999, Dunne and Raby 2001).

Another set of arguments builds on the need to acknowledge what is, so to speak, already there for us, e.g., that computational things need to be designed in ways that relate to existing environments (cf. Fogarty et al 2001, Hallnäs and Redström 2001). Further, there are arguments stating the need for technology development to learn from more established areas of design such as industrial design and architecture, especially as it is combined with such traditions (cf. Ehn 2002, Hallnäs, Melin and Redström 2002, McCullough 2004). Then there is the issue of foundations, and the need for aesthetics as a complement or alternative to existing approaches (cf. Bertelsen and Pold 2004, Hallnäs and Redström 2002a). Thus, there is not one, but a set of related issues and questions raised.

## *Complementary and Alternative Approaches*

Embedded in the arguments of why an aesthetics of computational things is needed, there are ideas of what such a perspective might imply to design. Roughly speaking, one can differentiate between two different development strategies. The first argues for the need to complement existing design methods centred on usability and practical functionality, to broaden the set of issues dealt with in design in order to accommodate the needs and desires of everyday life (as opposed to, say, professional work). Thus, aesthetics is positioned as an extension of the current perspective. The second perspective argues that there is a need to more or less replace the existing usability-oriented design approach with a 'new' one based on aesthetics – in other words, established methods based on practical functionality can not provide a proper foundation for an expanding interest in aesthetics. For the purpose of this discussion, we might refer to these approaches as either 'complementary' or 'alternative'.

It is central to realise that the question of how to treat aesthetics is different from the question of whether one needs to consider both functional and aesthetic issues in a given design process. We must not confuse the question of whether aesthetics and functional concerns are both relevant with the question of how we aim to deal with the two, where we look for their respective foundations, and so on. Thus, the present discussion of a complementary versus an alternative approach is primarily a discussion of how to position emerging aesthetic concerns in relation to established usability oriented approaches, and not whether or not they are both needed. As such, both strategies are 'complementary' in some sense but, as we will see, there are reasons for distinguishing between the two, since they depend on different arguments and thus carry different sets of implications for how we might think about aesthetics. It is, however, important to remember that this seemingly divisive approach is a way that this author uses to expose certain issues in the development of an aesthetics of interaction design, and thus is not necessarily a literal account of the intentions behind the work cited.

### *Complementary Approaches*

The basic argument of the complementary approach is that the issues dealt with in a design process centred on the practical functionality need to be expanded to include aesthetic aspects. The approach is one of adding aspects taken into consideration rather than a shift in basic understanding. It may, for instance, look like the following:

A pleasure-based approach to fitting the product to the person would, however, require a far richer picture of the person for whom the product is to be designed. ... Pleasure-based approaches still include looking at usability issues, so the cognitive and physical issues, including anthropometrics, are still important. However, because such approaches also take into account fitting the product to the person's lifestyle, there are many more issues that need to be considered. (Jordan 2000, p. 60)

Another example of how to build on current practice is this suggestion of how to extend usability engineering to include a broader set of aspects of use:

Traditional usability engineering methods are not adequate for analyzing and evaluating hedonic quality and its complex interplay with usability and utility. The techniques we have suggested might significantly broaden usability engineering practices by shifting the focus to a more holistic perspective on human needs and desires. In the future, we might see usability engineering evolving toward more complete user experience design—one that encompasses the joy of use. (Hassenzahl et al 2001, pp. 7f)

While aesthetics is perhaps just one part of what new aspects are intended here, it is clear that it is a question of adding dimensions to existing methodologies. Norman presents a somewhat similar perspective:

We scientists now understand how important emotion is to everyday life, how valuable. Sure, utility and usability are important, but without fun and pleasure, joy and excitement, and yes, anxiety and anger, fear and rage, our lives would be incomplete. ... The surprise is that we now have evidence that aesthetically pleasing objects enable you to work better. (Norman 2004, pp. 8-10)

Yet another example is Preece, Rogers and Sharp's notion of a transition from human-computer interaction to interaction design:

The realization that new technologies are offering increasing opportunities for supporting people in their everyday lives has led researchers and practitioners to consider further goals. ... The goals of designing interactive products to be fun, enjoyable, pleasurable, aesthetically pleasing and so on are concerned primarily with the user experience. By this we mean what the interaction with the system *feels* like to the users.... Hence, user experience goals differ from the more objective usability goals in that they are concerned with how users experience an interactive product from their perspective, rather than assessing how useful or productive a system is from its own perspective. (Preece et al 2002, p. 18f.)

The passage cited from Preece et al entails an important distinction, namely that there is difference between the objective evaluation criteria of a system-centric perspective and the subjective judgements that characterise aesthetic statements. Which leads us to a discussion of the 'alternative' approach.

### *Alternative Approaches*

The alternative approach is a more radical call for an aesthetics of pervasive computing that not only states that present design methods centred on the practical functionality are not enough, but they are not suitable as a foundation at all. Here, the call for an aesthetic perspective is also a call for an alternative foundation for interaction design. Bertelsen and Pold argues:

The basic problem is that in order to *understand* the dynamics of use as not only contingency, it is necessary to introduce a cultural unit of analysis. We need to take into account the broader cultural context in order to understand and design IT-based artefacts today, and we need to introduce perspectives on the use situation taking experience rather than cognition as the basic unit of analysis. In other words we feel that there is a need for a redefinition of HCI as an aesthetic discipline. ... We propose that aesthetics could be a new foundational concept for HCI: taking aesthetic theories of representation, experience, and sense perception as basic categories. (Bertelsen and Pold 2004, p. 24)

There is also a question of what set of values and objectives we build upon. Arguing that there is a need to reconsider the ambition to create a tight fit between user and product, Dunne states that:

In the Human Factors world, objects, it seems, must be understood rather than interpreted. This raises the question: are conventional notions of user-friendliness compatible with aesthetic experience? Perhaps with aesthetics, a different path must be taken: an aesthetic approach might subsume and subvert the idea of user-friendliness and provide an alternative model of interactivity. (Dunne 1999, p. 32)

If user-friendliness characterises the relationship between the user and the optimal object, user-unfriendliness then, a form of gentle provocation, could

characterise the post-optimal object. The emphasis shifts from optimising the fit between people and electronic objects through transparent communication, to providing aesthetic experience through the electronic objects themselves. (Ibid, p. 38)

Hallnäs and Redström have argued that aesthetics is the proper foundation for technology design as it turns from its current focus on efficient use towards a concern for meaningful presence:

When computer systems change from being tools for specific use to everyday things present in our lives, we have to change focus from design for *efficient* use to design for *meaningful* presence. (Hallnäs and Redström 2002a, p. 108)

When we let things into our lifeworld and they receive a place in our life, they become meaningful to us. We can say that this act of acceptance is in a certain sense a matter of relating expression to meaning, or of giving meaning to expressions. ... the result is that a thing becomes the bearer of meaningfulness through its expressiveness. It is this expressiveness and meaningfulness that is basic to design for presence. (Ibid p. 113)

It follows that good design from an aesthetical point of view basically is a logical question, not primarily a question of psychology, ethnography, sociology, etc. It is a basic axiom here that it is through the force of its inner logic, its consistent appearance, that a thing receives depth in its expression and thus its strength to act as a placeholder for meaning. Behind each expressive thing present in our lives there is an expressional with a strong form. (Ibid p. 116)

To summarize, we might say that aesthetics seems to mean several different things here, but that the call for aesthetics to a significant extent is made in relation/opposition to the typical focus on practical functionality. And so one thing we need to clarify in order to develop an aesthetics of pervasive computing is what this relation could be like, e.g., whether the complementary or the alternative approach is more appropriate.

A central question here is how we think of aesthetics in relation to the empirical studies of use and users that is often argued to be the base for usability oriented design, i.e., if there could be such an empirical foundation for aesthetical decisions. Yet another issue is what notions such as 'aesthetics of interaction' or 'beauty in use' are about, what it is that we refer to. These are all rather complex issues that we perhaps can not expect to be ready to answer at this point. What we can do, however, is to see to how our situation relates to the established discourse on aesthetics. And, fortunately, most of these issues have been under debate for a very long time.

## **Historical Perspectives**

Though descriptions of aesthetics in dictionaries tend to centre on the notion of beauty, our everyday use of 'aesthetics' include aspects from a series of transformations of the meaning of the term. Historically, our word aesthetics stems from *aisthesis*, which was used by Aristotle and the philosophers of his time to describe perception. However, divisions between perception, cognition, consciousness, etc., were not the same then as they are in contemporary thinking, and so their use of the term *aisthesis* is perhaps better understood as referring to a kind of 'lived experience' (as opposed to reasoning and thinking) since it seems to include more than just sensory perception as we understand it today (Aristotle *De Anima*).

The idea that aesthetics has to do with (the study of) the appreciation and creation of beauty, especially in art, was developed during the transition from 'classical' ideals of beauty centred on

normative rules, to the ‘romantic’ fascination with the individual genius and his/her ability to transcend given expectations and norms in the 18<sup>th</sup> century. These ideas are closely related to the shift in political and economic power that happened at the time; the shift in influence from church and aristocracy to the rising bourgeois culture. Though rather different from each other, these two basic views are still with us: more or less normative rules and guidelines still matter (as when we, for instance, use notions such as the golden section to compose a ‘good’ picture), as does the notion of beauty centred on the individual’s experience (as when we say that beauty is in the eyes of the beholder).

However, we also have an understanding of aesthetics that is not so much about beauty, but about the ways in which we experience things in a more general sense. For instance, in contemporary art we might expect to find things that challenge us, make us reflect and rethink, things that question given norms, etc., but that are not necessarily ‘beautiful’. Though our notion of aesthetics centres on beauty, we do acknowledge that to try to understand such work in terms of beauty would be to miss the point entirely. Instead, this often seems to be concerned with questions of representation, mediation, interpretation, appropriation, etc.

This wider notion of aesthetics as concerned with how we come to experience and understand the world in a rather profound sense is known as modern aesthetics, and can be said to originate with the work of Kant:

Tradition had placed the aesthetic beyond words and Kant’s ingenious move was to take its property of being resistant to conceptualization and make it the arena in which the interaction between consciousness and reality is worked out. For the first time, what exists beyond description is not placed beyond understanding or in opposition to everyday experience but argued to be the dynamic state of conceptual reappraisal that is constitutive of our attempts to deal with any new situation. (Cazeaux 2000, p. xvi)

Of course, aesthetics as well as most other things have developed significantly since the 18<sup>th</sup> century, so why is this still relevant? Consider what Kant refers to as the ‘antinomy of taste’, one of the issues he set out to resolve (Kant 1790, p. 338f):

1. Thesis: A judgement of taste is not based on concepts; for otherwise one could dispute about it (decide by means of proofs).
2. Antithesis: A judgement of taste is based on concepts; for otherwise, regardless of the variation among [such judgements], one could not even so much as quarrel about them (lay claim to other people’s necessary assent to one’s judgement).

This is a rather precise description of a fundamental problem in aesthetics, namely that although judgements of taste are expressed as if they were objective statements, they can not be determined on the basis of proof. A statement like “this chair is comfortable” appears to be objective, i.e., it appears to be stating something about the chair, yet it is inherently subjective and there is no way we can arrive at the conclusion that the chair is indeed comfortable either by empirical study or deductive proof. Still, somehow we are able to talk about the chair as being comfortable – though we might disagree about it.

### **Prospects for an Aesthetics of Interaction Design**

These historical perspectives have some interesting implications for how we might think about developing an aesthetics of pervasive computing. Let us begin with some implications of Kant’s first thesis, and the question of whether aesthetics in interaction design is best seen as an extension of existing concerns for practical functionality or if it indeed is something else (again remembering that this is not a question of whether we need to consider both practical

functionality and aesthetics in design, but whether or not the latter could be seen as an extension of the former). If we take the development of modern aesthetics by Kant and others into account, the answer to this question must be that it is by necessity something else, as it deals with judgements of taste and not properties of things that can be evaluated with respect to external criteria.

Though the two statements “this device is waterproof” and “this device is attractive” might appear to be similar, and thus possible to treat in similar ways, they are fundamentally different from each other. Whereas we can evaluate the ‘waterproofness’ of a device (given a set of parameters and some mode of investigation of course), we can not, by means of any empirical investigation, determine whether a device is attractive or not. Of course, we can come up with operational criteria such as that attractiveness in this case means that 67% of the people in a study state that it is attractive when asked about their opinion, but that is a completely different thing from saying that the thing is attractive.

By a principle of taste would be meant a principle under which, as condition, we could subsume the concept of an object and then infer that the object is beautiful. That, however, is absolutely impossible. For I must feel the pleasure directly in my presentation of the object, and I cannot be talked into that pleasure by means of any bases of proof. (Kant 1790, p. 285)

This does not only have consequences for how we think about evaluations. Though we might try to relate aesthetical design decisions to studies of users the way we relate decisions to measures of functional performance, there is an important difference between the two. From the discussion above, it follows that we can not deduce aesthetical design decisions from any empirical material. Or in other words, aesthetical decisions will be made on grounds other than the empirical basis human factors aims to build on. Thus, there does not seem to be a case for the complementary approach, i.e., that we can build on the tradition of user studies and evaluations also when it comes to aesthetics. Rather, we need to think of the realm of aesthetics as something distinct from functional concerns and thus look for its foundation elsewhere.

This distinction is sometimes confused in user-centred design, and so let us consider another domain instead: how would one study what characterises, say, a certain symphony by Beethoven? And how do we compare it to a symphony by Berlioz? Of course, we would learn something by asking people what they think of them, or by studying people performing or experiencing these pieces – but that something would not help us understand the musical works as such. Rather, one would have to read the scores, perform them, listen and analyse how they were made, their use of form, material, compositional techniques, and so on. And so, why is that we think we learn what a computational thing is by studying its use? Answering this question reveals the bias of our perspective.

Without a strong foundation in empirical studies, it may seem as if we do not have any real possibility for a systematic treatment of aesthetics in technology development. This, however, is not the case as we turn to the second thesis in Kant’s analysis; that we indeed are able to talk about these matters. Whereas we can not decide whether the chair I’m sitting on now is comfortable or not by means of proof, we can certainly talk about it, discuss it, and through critical examination of the object find out more about it. Here, it is the inner logic of the thing that becomes the focus of our analysis.

Though certainly subjective and definitely embedded in various social and cultural contexts, critical examination of the expressions of a thing can be cultivated to the extent that it becomes systematic and reaches beyond statements about whether we like a given thing or not. Typical examples exist in the analysis of art and the field of art criticism, but we can find it elsewhere as well. Consider for instance more elaborate car enthusiast publications and magazines: the way the driving experience is described by relating technical terms such as power, torque, engine type, drivetrain, etc. to expressions of the car in use like character, temperament, liveliness,

power, balance, etc. Often, we never get to drive the actual car ourselves, yet such descriptions seem to give (some of) us an idea of what it could be like that is rather precise and there are clearly certain principles according to which these reviews are made. Another relevant example is the growing area of review and critique of computer games. One would perhaps not argue that this criticism is scientific, but then again, neither is design. Still, it can be highly systematic and informative and as such a basis for richer experience and deeper understanding. It is such a critical discourse that we need to develop and cultivate in pervasive computing to be able to deal with aesthetics.

### **Developing Interaction Aesthetics**

Though brief, the overview presented above hopefully illustrates that we find ourselves in a very rich context as we start developing frameworks for how to treat aesthetics in interaction design. The notion of an aesthetics of interaction puts us in an intriguing position with respect to the relation between the thing experienced and the person experiencing it. For instance, Kant describes the appreciation of beauty as a kind of ‘disinterested contemplation’ (*interesseloses Anschauen*) (Kant 1790), which not really seem to characterise the rather active relation we have to the things we *use* and *live* with (cf. also e.g. Gadamer 1977). It seems reasonable to ask: When we shift from an interest in the expressions of things, to the expressions of things in use, what is it that we refer to? This is perhaps the central question one has to address when developing frameworks for aesthetics in interaction design.

Let us compare the design of a typewriter keyboard and the keyboard of the piano. The design logic of the qwerty-keyboard centres on the way the keys have been arranged to enable us to write at maximum speed with respect to basic technical limitations of the mechanical device, i.e. without jamming the keys. The design of the piano keyboard, on the other hand, has evolved to allow maximum expressiveness in terms of dynamics and how we control the timbre through the way we press the keys (though of course which keys we press and also when has some significance when performing music). Clearly, we can talk about the differences in design aesthetics between the typewriter and piano considered as physical objects, but we can also talk about design aesthetics in terms of expressions (and expressiveness) *in use*. As both keyboards in many ways are solutions to interaction design problems (i.e., how to enable quick but not too quick typing; how to enable control of dynamics and timbre), they also carry with them an explicit idea of what and how using them could (or even should) be like.

We might say that what has been designed is not only an object, but also a series of acts of using it (Hallnäs & Redström 2006). These two layers are quite visible as we turn to the expressions of using these things – just picture someone using a typewriter in comparison to someone playing the piano. It is certainly not only the expressions of the *things* used that are different in these two pictures. Though related, the expressions of the thing as such and of the acts of using it are quite different things – now picture someone typing on a typewriter the way a musician performs with her instrument, or playing the piano the way we type on a keyboard. The aesthetic potential of such combinations – and re-combinations – of things and acts of using them has been explored in art for some time now; in relation to our discussion of keyboards and the art of using them, the use of machine-like performance in electronic music can serve as an illustration, e.g. Kraftwerk’s *The Man Machine* (Capitol 1978).

We may now return to the question of what it is that we refer to when we say that we shift from a focus on the expressions of things, to the expressions of things in use. As we design things meant to be used (by someone), we also design ways of using them and it is towards the expressions of these ways, or acts, of use that we now turn. But it is not a shift from what a thing *is* to what it *does* as we use it, nor is it a shift from what the object is to what its user

*experiences*; rather, it is a shift towards the user as *performer*, where the object becomes an *instrument*.

### **Emerging Frameworks for Aesthetics in Interaction Design**

Though the area of aesthetics in pervasive computing is still far from presenting a more coherent framework like the one we now have for handling usability issues, several attempts are being made to develop notions such as “beauty in interaction” (Djajadinigrat et al 2004), “beauty in use” (ibid), “aesthetics of interaction” (ibid), “aesthetics of use” (Dunne 1999, Graves Petersen et al 2004), and “aesthetics of functionality” (Hallnäs and Redström 2001). In the following, four different approaches will be introduced as to give the reader an idea of what issues are being addressed and how.

Based on an industrial design tradition, Djajadinigrat, Frens, Overbeeke and Wensveen have developed notions of ‘formgiving’ with respect to issues in interaction design:

To us, good interactive products respect all of man’s skills: his cognitive, perceptual- motor and emotional skills. Current interaction design emphasises our cognitive abilities, our abilities to read, interpret and remember. We are interested in exploring the other two. (Djajadinigrat 2004, p. 297)

As such, their approach centres on three aspects of interaction (ibid p. 297):

- interaction patterns: the timing, flow and rhythm linking user actions and product reactions
- richness of motor actions: to make use of a broader band of perceptual- motor skills
- freedom of interaction: the ability to choose how to interact

In the work of Dunne, central elements concern instead the potential of the aesthetic to criticise and question, e.g., by exposing certain values and structures in design. Introducing notions such as “para-functionality” and the “post-optimal” object, Dunne’s approach aims at (Dunne 1999, p. 109):

- going beyond optimisation to explore critical and aesthetic roles for electronic products
- using estrangement to open the space between people and electronic products to discussion and criticism
- designing alternative functions to draw attention to legal, cultural and social norms
- exploiting the unique narrative possibilities offered by electronic products
- developing forms of engagement that avoid being didactic and utopian

Bertelsen and Pold base their perspective on the practice of art criticism, especially in the field of new media. As a basis for evaluation of interfaces, they suggest considering the following issues (Bertelsen and Pold 2004, p. 26):

- stylistic references in the interface
- use of standards and conformance to tradition
- materiality and remediation: immediacy and hypermediacy
- genres in the interface
- the interface as a hybrid between the functional (control interface) and the cultural interface
- representational techniques, e.g. realistic and naturalistic representations vs. symbolic and allegorical representations
- challenges to users' expectations
- developmental potentials, e.g., of unanticipated use

Yet another set of issues are in focus in the work by Hallnäs and Redström (2001, 2002a, 2002b, 2006). Here, the focus is on the internal structure of a design, its inner logic, and so issues like the following have been explored:

- how computational things build their presence
- the expressions of computational technology as design material
- the relation between spatial and temporal form elements in combinations of computational and traditional design materials
- interaction design as act design
- the expression-structure of acts

Clearly, these four examples of what an ‘aesthetics of interaction’ could be like, point toward related but quite distinct directions. As such, the approaches presented also illustrate the complexity of the issues at hand and the need for us to leave more ‘classical’ ideas such as set rules and guidelines behind (cf. Bertelsen and Pold 2004). However, if we try to find recurring themes that could indicate general issues that are relevant to address in the development of new pervasive information systems, the central idea seem to be that we need to create a richer relation to our computational things, e.g. through the exploration of:

- engagement rather than efficiency in use,
- temporal structures, e.g. interaction patterns and expressions of use that evolve over time,
- alternative forms of use that even challenge expectations on use and user,
- relations to context, e.g. cultural references, user identity, traditions, other design domains,
- alternative interface and material combinations.

Another common feature is, therefore, that they to a rather limited extent address issues related to for instance the use of graphic design aesthetics in interface design or how to express basic functionality through physical form as done in industrial design, but that they instead focus on what new areas for expression are opened up by pervasive technologies. This should not be understood as an exclusion of such already established issues and areas, as they are often relevant also within this area, but rather as that is not where we will primarily find the new challenges that this technology pose to design

Further, these accounts do not only tell us that there are many different values and ideas promoted here, they also tell us something about where we can look for relevant work done in other fields, as they all relate to ideas developed elsewhere which can be of use in interaction design. As such, they point to the potentially very rich perspective a more developed account of aesthetics could provide in interaction design.

## Conclusion

In many ways, a technological and an aesthetic perspective seem to be in opposition. The technical object is typically characterised by its practical function. Kroes writes that “an essential aspect of any technical object is its function; think away from a technical object its function and what is left is just some kind of physical object. It is by virtue of its practical function that an object is a technical object.” (Kroes 2001, p. 1). The aesthetic object, on the other hand, can be something without ‘purpose’ at all: a “purposeful purposelessness or a purposeless play”, as Cage says about music (Cage 1961, p. 12).

To complicate things further, this is not only a question of the object as such, but also our way of experiencing it, our basic perspective and understanding. For instance, Heidegger used the notion of a technological perspective to describe a way of looking at the world as being the means for one’s ends, like a ‘standing reserve’ (*Bestand*) (Heidegger 1977). Aesthetic experience, on the other hand, was considered by Kant to be a kind of ‘disinterested contemplation’ (*interesseloses Anschauen*) (Kant 1790). Of course, things are not necessarily this polarized, and certainly these views have been contested many times since they first were

presented. Nevertheless, they indicate that our present interest in the aesthetics of technology, from a designer's point of view, is a melting pot where sometimes seemingly contradictory perspectives and traditions come in contact with each other. It is no surprise we sometimes become confused.

This cross-fertilization could, however, offer us an interesting and potentially highly creative future in terms of new methods for technology development and aesthetics in design (cf. Borgmann 1995, Ehn 2002, Zaccai 1995). The fact that aesthetic approaches differ significantly from the usability-oriented approaches currently in focus, need not be understood in terms of competition, i.e. that we need to choose one and leave the other. Aesthetics provide us with an alternative foundation for technology development that builds on a different tradition, a different set of concepts, objectives and methods, compared to the ones now dominating the way we think and work. As such, it gives us a complementary perspective that we can use to deepen our understanding of this new technology of ours. And a greater variety of perspectives on information technology is dearly needed.

## References

- Aarts, E. and Marzano, S. (eds.) *The New Everyday: Views on Ambient Intelligence*. Rotterdam: Uitgeverij 010 Publishers, 2003.
- Aristotle *De Anima* (On the Soul), trans. Lawson-Tancred, H. London: Penguin Books, 1986.
- Bertelsen, O.W. and Pold, S. Criticism as an approach to interface aesthetics. In *Proceedings of the third Nordic conference on Human-computer interaction*. New York, ACM Press, 2004, pp. 23-32.
- Borgmann, A. The Depth of Design. In Buchanan, R. and Margolin, V. (eds.) *Discovering Design*. Chicago: The University of Chicago Press, 1995, pp. 13-22.
- Cage, J. *Silence*. Middletown: Wesleyan University Press, 1961.
- Cazeaux, C. (ed.) *The Continental aesthetics reader*. London, Routledge, 2000.
- Djajadiningrat, T., Wensveen, S., Frens, J. and Overbeeke, K. Tangible products: redressing the balance between appearance and action. *Personal and Ubiquitous Computing*, 8, 5 (2004) 294 – 309.
- Dunne, A. *Hertzian Tales; Electronic products, aesthetic experience and critical design*. London: RCA CRD Research publications, 1999.
- Dunne, A. and Raby, F. *Design Noir: the secret life of electronic objects*. Berlin: Birkhäuser and London: August Media, 2001.
- Ehn, P. Neither Bauhäusler nor nerd; educating the interaction designer. In *Proceedings of the conference on Designing interactive systems: processes, practices, methods, and techniques*. New York: ACM Press, 2002, pp. 19-23.
- Fogarty, J., Forlizzi, J. and Hudson, S.E. Aesthetic information collages: generating decorative displays that contain information. In *Proceedings of the 14th annual ACM symposium on User interface software and technology*. New York: ACM Press, 2001, pp. 141-150.
- Gadamer, H.-G. Aesthetics and Hermeneutics. In Linge, D. E. (trans. and ed.) *Philosophical Hermeneutics*. Berkeley: University of California Press, 1977, pp. 95-104.
- Gaver, B. and Martin, H. Alternatives: exploring information appliances through conceptual design proposals. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. New York, ACM Press, 2000, pp. 209-216.
- Gaver, W.W., et al. The Drift Table: Designing for Ludic Engagement. In *CHI '04 extended abstracts on Human factors in computing systems*. New York: ACM Press, 2004, pp. 885-900.
- Graves Petersen, M., Sejer Iversen, O., Gall Krogh, P. and Ludvigsen, M. Aesthetic interaction: a pragmatist's aesthetics of interactive systems. In *Proceedings of the 2004 conference on Designing interactive systems: processes, practices, methods, and techniques*. New York: ACM Press, 2004, pp. 269-276.

- Hallnäs, L., Melin, L. and Redström, J. Textile Displays: Using Textiles to Investigate Computational Technology as Design Material. In *Proceedings of the Second Nordic Conference on Human-Computer Interaction (NordiCHI 2002)*. New York: ACM Press, 2002, pp. 157- 166.
- Hallnäs, L. and Redström, J. Slow Technology: Designing for Reflection. In: *Journal of Personal and Ubiquitous Computing*, 5, 3 (2001) 201-212.
- Hallnäs, L. and Redström, J. From Use to Presence: On the Expressions and Aesthetics of Everyday Computational Things. *ACM Transactions on Computer-Human Interaction (ToCHI)*, 9, 2 (2002a), 106-124.
- Hallnäs, L. and Redström, J. Abstract Information Appliances; Methodological Exercises in Conceptual Design of Computational Things. In *Proceedings of the conference on Designing interactive systems: processes, practices, methods, and techniques*. New York: ACM Press, 2002b, pp. 105-116.
- Hallnäs, L. and Redström, J. *Interaction Design: Foundations, Experiments*. Borås: Interactive Institute and the Textile Research Centre, Swedish School of Textiles, University College of Borås, 2006.
- Hassenzahl, M., Beu, A. and Burmester, M. Engineering Joy. *IEEE Software* January/February 2001, pp. 2-8.
- Heidegger, M. *The question concerning technology*. New York: Harber and Row, 1977.
- Jordan, P.W. *Designing Pleasurable Products: An Introduction to the New Human Factors*. Abingdon: Taylor and Francis, 2000.
- Kant, I. *Critik der Urtheilskraft*. Berlin: Lagarde und Friedrich, 1790. Citations taken from: Critique of Judgement, trans. Pluhar, W. S. Indianapolis: Hackett, 1987.
- Kroes, P. Technical Functions as Dispositions: a Critical Assessment. *Techné (Electronic Journal of the Society for Philosophy and Technology)*, 5, 3 (2001) 1-16.
- McCullough, M. *Digital Ground; Architecture, Pervasive Computing, and Environmental Knowing*. Cambridge: MIT Press, 2004.
- Norman, D.A. *Emotional Design; Why we love (or hate) everyday things*. New York: Basic Books, 2004.
- Preece, J., Rogers, Y. and Sharp. H. *Interaction Design: Beyond Human-Computer Interaction*. New York: Wiley and Sons 2002.
- Zaccai, G. Art and Technology; Aesthetics Redefined. In Buchanan, R. and Margolin, V. (Eds.) *Discovering Design*. Chicago: University of Chicago Press, 1999, pp. 3-12.