

DESIGN SEMANTICS OF INNOVATION

Product language as a reflection on technical innovation and socio-cultural change

Dagmar Steffen

Author Contact:

Dagmar.Steffen@gmx.de

Department of Art and Design History, Bergische Universität Wuppertal, Germany

Abstract

Innovation is a much-discussed issue in design since it is considered to be a key element in highly competitive markets. Nevertheless, the specific contribution of design and designers in the context of product innovation is insufficiently understood and explored. Mostly, innovation is meant to be the achievement of science and technology, while design as the last element in this chain has the task to introduce the scientific and technological innovation into the life-world of the user. This concept underrates the fact that artefacts that are not new with regard to technology can be highly innovative in terms of symbolic expression of socio-cultural changes and the spirit of the time. The objective of the paper is an exemplary study of historical and current product innovation from the perspective of design semantics. The investigation is based on the Offenbach approach, the so-called theory of product language and its distinction between formal aesthetic functions, indication functions, and symbol functions.

1. State of the Art: Relationship between Design and Innovation

Literature makes clear that there is a considerable diversity of positions concerning the relationship between design and innovation. Some authors point out that, with regard to improvement and making human conditions better off, innovation and design share the same goals. They claim that design and innovation are sort of synonymous (German Design Council 1983); design can only be justified by an innovative context. (Chiapponi 1999) Others consider design and innovation to be complementary: two partly overlapping activities or fields that share an area of intersection, but at the same time they each cover much broader areas. (Press/ Cooper 2003) Frequently, new or at least improved technology is required as a precondition for innovative design. The primary challenge for design is the integration of the demands of technology and market research to produce user-friendly and attractive products. (Roy/ Wield 1986, Bonsiepe 1996) Innovative design is the last element in the chain of innovation. At first, science investigates basic knowledge; on this basis the engineering disciplines develop new products or services. Finally, design has the task to introduce the scientific and technological innovation into the domain of social practices in daily life. From this point of view, artefacts with new design that lack of technical improvement come close to morally blameful styling, mere formal variation for its own sake and newness devoid of any deeper meaning.

What all these descriptions have in common is that they do not reflect the role of product semantics. But, technical innovation is one matter; the product language of technically advanced products is another matter altogether. On the one hand – whether intended or unintended – the innovative character of products can be reversed by product language. As is generally known, until the end of the 19th century steam engines, industrial output and skyscrapers were designed with reference to historical styles. With regard to semantics of style, these design concepts strove for a "mixture" and "reconciliation" of new and old (Selle 1997): Up-to-date technology and elements of traditional styles such as "antique" pillars were fused into a single design. On the

other hand, product semantics can emphasize technical progress by giving products an eye catching, unfamiliar or futuristic appeal. During the last few decades, this approach was more common and desirable.

Apart from the hypothesis that the integration of new technology in daily life challenges a semantic stance, this paper argues that science and technology are not the only sources of innovative product design. Alterations of basic societal conditions, socio-cultural upheaval, and the arrival of new viewpoints and values are just as important for the creation of innovative designs or new product languages. Artefacts that are not innovative with regard to technology might be epochal with regard to the expression of the spirit of the time. As long as those artefacts embody fundamental ideas or values of certain social groups or society as a whole, they are wrongly judged as mere formalism. Since further analysis of the relationship between design and innovation employs the Offenbach theory of product language, this concept will be described in brief.

2. The Offenbach Theory of Product Language

Since the mid 1970s Jochen Gros (1976, 1983, 1984, 1987) and Richard Fischer (1984) from the Academy of Art and Design Offenbach (Germany) developed the so-called theory of product language. In this conceptual model, Gros makes a distinction between the practical functions of a product (and various others such as ergonomical, economical, ecological functions) on the one hand, and the formal and communicative aspects, the so-called product language functions on the other. Analogous to the differentiation commonly deployed in a science of language between syntax and semantics, Gros subdivided the specific object of product language into formal aesthetic functions, i.e. those aspects that can be observed irrespective of the meaning of their content – and the semantic functions. Defining the latter as the bearers of meaning and following Susanne Langer's (1963) distinction between sign and symbol, he then proceeded to differentiate between sign functions or indication functions¹ and symbolic functions in this group. (Fig. 1)

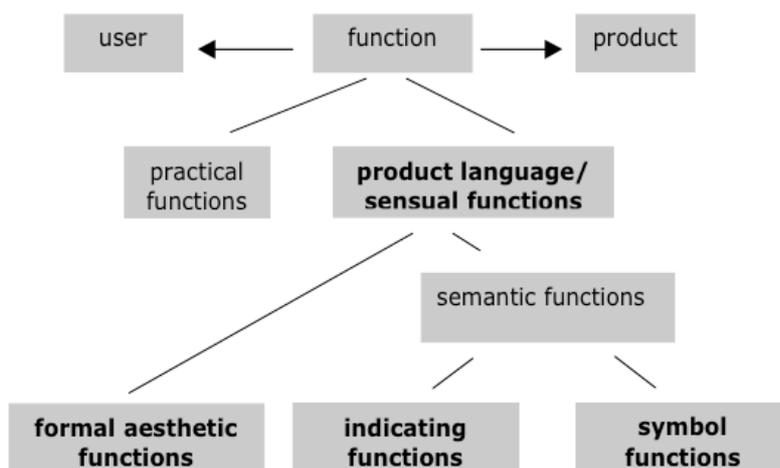


Fig. 1: Conceptual model of the Offenbach Theory of Product Language (Gros 1976).

2.1 Formal aesthetic functions

As has been said, the formal aesthetic functions correspond to the syntax or "grammar" of the design concept. Based on the insights of perceptual and gestalt psychology (von Ehrenfels 1890, Arnheim 1969, Katz 1961, Metzger 1984), the formal aesthetic functions distinguish two antagonistic principles: order versus complexity, and reduction of stimuli versus richness of stimuli in terms of shapes, colour, texture, material etc. As Arnheim

¹ In her book *Philosophy in a New Key* (1942) Susanne Langer uses the term "sign", which is translated in the German edition of her book – in accordance with the meaning expressed by Langer – as "Anzeichen". The theory of product language took over this term. By re-translating the theory of product language from German into English, the German terms "Anzeichen" and "Anzeichenfunktionen" were translated as "indication sign" and "indication functions".

(1966) has pointed out, order and complexity are antagonistic in the sense that "order tends to reduce complexity while complexity tends to reduce order. Order and complexity, however, cannot exist without each other. Complexity without order produces confusion; order without complexity produces boredom." Gros and Steffen (2000) identified 11 principles of order and complexity that guide the analysis of formal aesthetic functions of products (in the widest sense, including graphic design, architecture etc.). (Fig. 2)

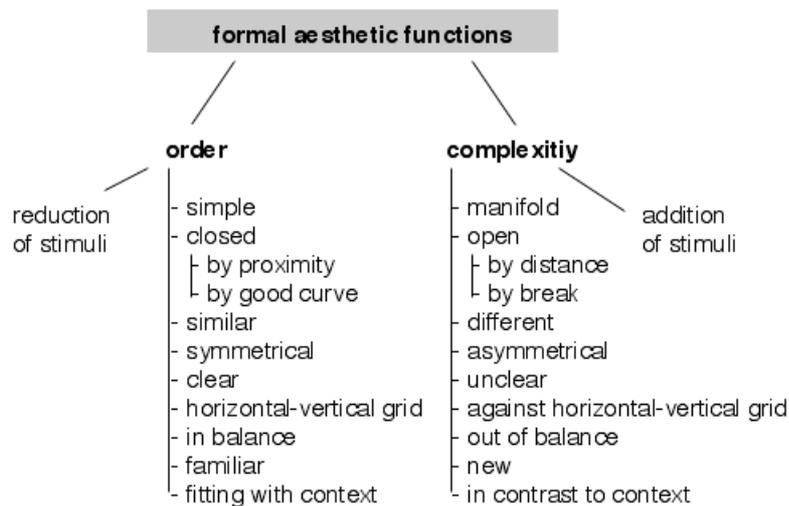


Fig. 2: Conceptual model of the Offenbach Theory of Product Language: the Formal Aesthetic Functions

2.2 Indication functions

Indication functions are directly related to the product and enable the nature of a product or the product category to be identified. Furthermore, indication functions conciliate technique and human beings, they visualise and explain the various practical functions of a product and how it should be used. (Fig. 3) Thus, they play an important role concerning recognition, usability and self-explanation of products. Often it is due to insufficient indication functions if the user is not able to operate a product properly.

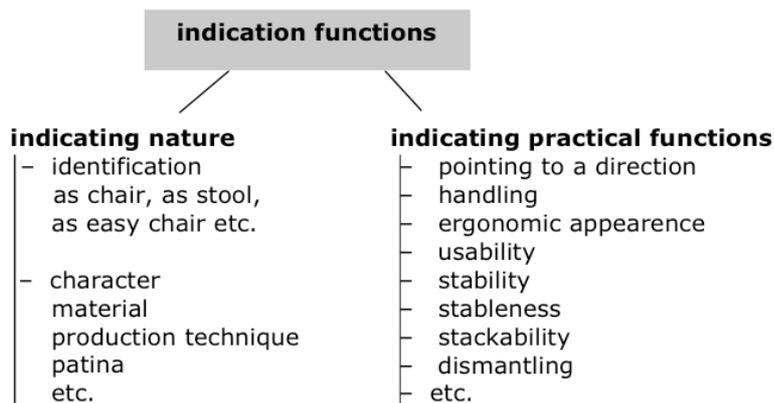


Fig. 3: Conceptual model of the Offenbach Theory of Product Language: the Indication Functions

2.3 Symbol functions

Distinct from signs, which indicate the nature and the practical functions of products, symbols are associated with objects in the imagination of the recipient or user. While there exist various concepts and definitions of the term symbol in history, the theory of product language refers to the related concepts by Langer (1963), Arnheim (1969) and the psychoanalyst Lorenzer (1970). According to them, the meaning of symbols includes denotations as well as connotations. With regard to indication signs and symbols, Langer states: "The fundamental difference between signs and symbols is this difference of association, and consequently of their

use by the third party to the meaning function, the subject; signs *announce* their objects to him, whereas symbols *lead him to conceive* their objects.” Thus, the symbol functions refer to conceptions and associations that come to a persons mind while contemplating an object: for example, societal, socio-cultural, historical, technological, economical and ecological aspects. They convey, for example, conceptions of a period style or various partial styles. Since symbols are based on cultural and social conventions and traditions, knowledge of cultural norms and context is crucial for understanding the message and meaning of a product in the way it was intended. Finally, the symbolic functions evoke associations like cold or warm, male or female etc. (Fig. 4) It is the symbolic meaning first of all that provokes emotional reactions and on whose account we love and desire or dislike products. (Ritterfeld 1996)

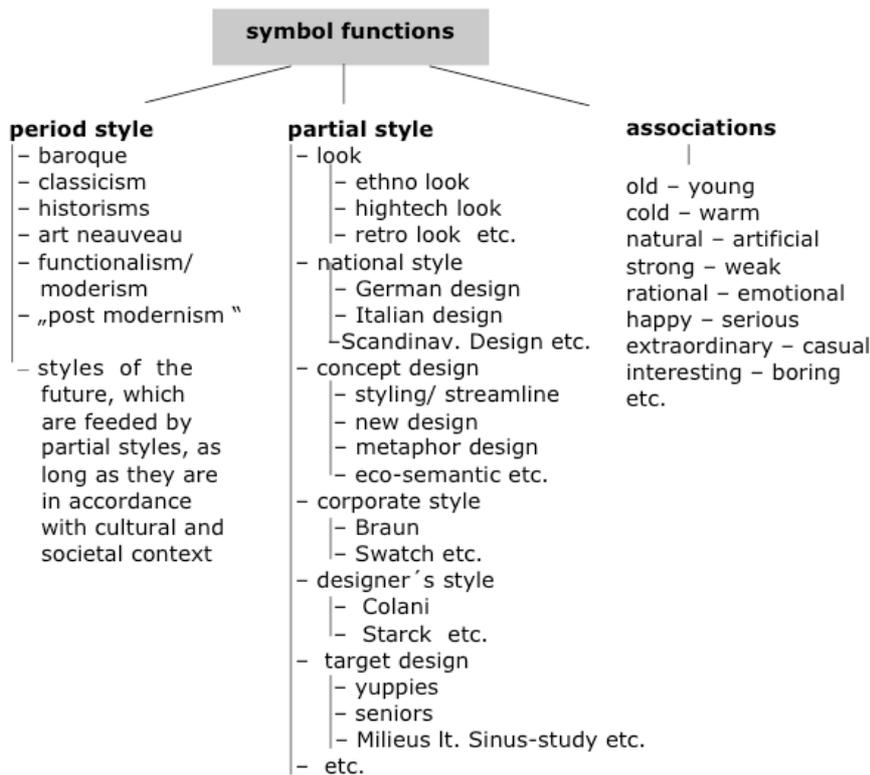


Fig. 4: Conceptual model of the Offenbach Theory of Product Language: the Symbolic Functions

3. Semantics of Innovation

From the point of view of the Offenbach approach, product language and the formulation of the communicative product message and the choice of appropriate formal means is considered to be the specific domain of the designer, while specialists such as engineers, ergonomists etc. are responsible for practicality and various other product functions. Thus, based on case studies the paper will describe how innovation – both technical and socio-cultural innovation – is communicated by means of product language. In this respect, the designer plays a crucial role in the innovation process.

3.1 Product language of technical innovation: indication functions

Breakthrough technological innovations might result in products and applications that have no predecessors at all. Take for instance the radio, a typical example for the so-called chain of innovation. Around 1886 Heinrich Hertz discovered electromagnetic radiation; ten year later, Guglielmo Marconi transformed this discovery into useful results by inventing the wireless telegraph. When the very first broadcast receivers were available for private customers in the mid 1920's, they were more or less devoid of any conscious design. Some of the technical components were mounted on a chassis, while antenna, battery and loudspeakers were separate

components. In other words, at the time of market entry the radio had no characteristic nature or a recognizable gestalt. Furthermore, usage of the device required some expert knowledge. Thus, it was a challenge for the industrial designer to bridge the gap between technique and user by creating a significant and usable object with some signs that indicate its nature and function. In such cases, to create product language for technological innovation means to visually define the product category, the product functions and the way the product should be used by means of indication signs. After a few years, a dominant type evolved and the radio became a semantically well-defined item. Indication signs made it possible to identify and operate the devices easily. The casing embraced all of the technical components; the loudspeaker, indicated by slits, perforation or a fabric covering the opening in the casing, defined the front. Furthermore, the front presented some knobs for on/ off, volume control and tuning as well as a scale indicating the wavelength. Even if there was a considerable variety of ways these elements were designed, they unmistakably defined the product category.

In summary, technological innovations are a challenge for the industrial designer since he or she has to mould new functions into a form that is usable and recognizable. The development of a coherent conceptual model and the design of indication functions is an essential part of this task since the "nature" of an artefact is not as obvious and inalterable as, for example, the "nature" of a tree. Instead, the nature of an artefact is shaped by design proposals, enforced by peers, and established by cultural habits or traditions. Since the nature of the object is culturally constructed to a certain degree, it is possible to de-construct and re-design its nature by suppression of typical indication signs or by emphasising different practical functions. Thus, the re-design of indication functions becomes itself a source of innovation.

3.2 Product language of societal and socio-cultural change: symbol functions

As had been said, the symbol functions of products refer to broader contexts of product culture: they reflect, for example, basic societal conditions and socio-cultural affiliation; and they express and consolidate notions, values and mentality of particular social groups or society as a whole. Thus, symbolic expression of new conditions, notions, values etc. and the development of novel (partial) styles is also an important design-specific contribution to product innovation. A review of the achievements of the modern avant-garde at the beginning of the 20th century serves as a case study. At the time, success of science, technological progress and the transition from trade to industrial production has had a huge impact on the way people live, on political ideas and visions, and on socio-cultural values and future expectations. Institutions such as the German Work Confederation (Deutscher Werkbund) and the Bauhaus recognized the challenge of designing a radically new product culture. They antagonized the symbols of the old culture, such as ornamentation, signs of individuality and status. Instead, the new principles and values of industrial mass production – rationalization, standardization, modern functionality and internationality – were generalized. They became maxims of progress and success in all spheres of modern life and had strong influence on the symbol functions of the artefacts. In other words: Functionalist design and International Style symbolised the essence of modern culture and industrial mass production.

This example provides several insights: First, the success of Bauhaus products such as tubular steel furniture was not only based on technical innovation but also on the embodiment of the values of modern mass culture. The strikingly new symbolic meaning and "style" cast a spell over a certain group of early adopters. Second, it was not the aim of the designers to create status symbols for an intellectual elite. Thus, the products incurred projections and their symbolic meaning was shaped to some degree by the customers' response. Third, societal changes – in this case the rise of a certain social group and its striving for self-expression – and the embodiment in product symbolism is not a post-modern phenomenon, as Cova and Svanfeldt (1993) suggested.

In summary, symbolic innovation enables the designer to position him- or herself actively in the societal and cultural realm. For the designer it is a means to reflect and fortify new societal, socio-cultural, technological, economic or ecological tendencies and to offer the audience a symbolically transformed embodiment. Having said this, the case study challenges Adam Richardson (1993), who argued that what he called "conventional semantics" does not address cultural aspects, or the "culture-product relationship". From the viewpoint of the Offenbach theory of product language, this assertion is based on a misconception of semantics. The active cultural and even political stance of the modern avant-garde in the 1920s as well as the commitment of various counter design movements since the 1960s refute Richardson's objection.

3.3 Distinctness of the product language innovation: formal aesthetic functions

Apart from semantic functions and the contents of innovation, the formal aesthetic functions also have to be analysed when it comes to the design of innovative products. What formal means are used in order to create the impression of newness? How do formal means contribute to the creation of products that communicate at first glance that they are "innovative"?

During the decades between the 1920s and the 1960s, the modern avant-garde was quite successful in communicating the innovative character of modern architecture and product culture. In all fields of design the complexity of traditional forms was replaced by a high order of simple geometric forms and the elimination of ornamentation, which contributed to this as well. Only after the International Style became dominant did high order turn into the negative. Concurrent formal means that contribute to high order (see fig. 2) had forfeit their power to communicate newness and innovation. Thus, in an environment where the dominant style is characterised by order, its antagonist, i.e., complexity, regains the ability to draw attention. Accordingly, in the 1970's and 1980's the upcoming partial styles such as High-Tech, Alchimia or Memphis showed complexity.

4. Perspectives: Infinite Innovation or Dearth of Innovation Resources?

Technological innovation was a driving force for more than a century, while in the saturated consumer markets of the 1980s and 1990s the symbolic embodiment of socio-cultural and societal change became an increasingly important factor in the competition for innovation. (Cova 1993, Buck et al 1998) But what will the future look like? Is innovation, as some assume, infinite? (Petroski 1992) Or might there be a dearth of innovation resources, as others claim? (Schulze 1997, 2004; Sloterdijk 2005) What will the challenges for design be in the future? In order to answer these questions, the drivers of innovation – technological progress, societal and socio-cultural changes – as well as the available formal means, have to be scrutinised.

Generally, engineers and functionalist designers are accustomed to arguing that technical improvements are always possible. Indeed, principles such as "not good enough" or "not enough performance" have been guiding product development during the last few decades. Tools and household appliances, appliances for personal hygiene, for preparation of food, for personal transport and, last not least, consumer electronics are constantly refined and optimised. Thus, many products have reached a point where the next product generation offers only marginal benefits. It seems that at least some product categories are developed through to the end. At this state of the art, one way out of finite technical innovation is for next generation technology to carry on. Thus, design might follow the track of NBIC (nano, bio, info, cogno) or BANG (bio, atoms, nano, gene). Design has to explore the semantic implications of these technologies, if there are any.

Since functionalism has failed to autocratically represent the current period style, it was and still is accompanied by numerous partial styles. Indeed, during the last few decades we have faced a firework of alternating partial styles. (See fig. 4) Will it continue? Will it become even brighter? With regard to symbolic innovation, the key question is whether there are relevant meanings and messages that urge for embodiment and communication. Thus, the drivers of innovative symbolic expression have to be discussed: for example, the changing life styles

and values of various target groups; the need for identity and novelty of brands and companies; and, last not least, the rise of new concepts such as customization or open innovation.

Finally, the communication of newness and innovation is easily gained if there are formal aesthetic means available that are unusual and not yet introduced in a specific context (temporal or spatial realm or product category). However, currently partial styles of high order (i.e. new functionalism, minimalism) and partial styles of high complexity (i.e. appropriation, neo-pop) (Williams 2006) coexist. Furthermore, at least one century of intensive searching for new, distinctive and surprising aesthetical effects is behind us. It seems that almost the full range of formal means has been tested and checked out. The creation of artefacts that represent a striking formal contrast to the already existing is becoming increasingly difficult.

5. References

- Arnheim, Rudolf (1966): *Towards a psychology of art*, Berkeley.
- Arnheim, Rudolf (1969): *Visual Thinking*, Berkeley, California, University of California Press.
- Bonsiepe, Gui (1995): *The Chain of Innovation*, in: *Design Issues*, Vol. 11, Nr. 3, Spring 1995, p. 33-36.
- Buck, Alex/ Herrmann/ Lubkowitz (1998): *Handbuch Trendmanagement. Innovation und Ästhetik als Grundlage unternehmerischer Erfolge*, FAZ-Publishers, Frankfurt am Main.
- Chiapponi, Medardo (1999): *Cultura sociale del prodotto. Nuove frontiere per il disegno industriale*, Milano. Quoted by: Raimonda Riccini (2001): *Innovation as a Field of Historical Knowledge for Industrial Design*, in: *Design Issues*, Vol. 17, No. 4, p. 24-31.
- Ehrenfels, Christian von (1890): *Über Gestaltqualitäten*; and: *Höhe und Reinheit der Gestalt* (1916), in: *Gestalthaftes Sehen*, ed by Ferdinand Weinhandl, Darmstadt 1974.
- Fischer, Richard/ Mikosch, Gerda (1984): *Grundlagen einer Theorie der Produktsprache. Anzeichenfunktionen*, edited by Hochschule für Gestaltung, Offenbach am Main.
- German Design Council (ed.) (1983): *Design und Innovation (Design-Materialien, Issue 5)*, text by Rudolf Schönwandt
- Gros, Jochen (1976): *Sinn-liche Funktionen im Design*, in: *form, Zeitschrift für Gestaltung*, 1st series No. 74, 2nd series No. 75.
- Gros, Jochen (1983): *Grundlagen einer Theorie der Produktsprache. Einführung*, edited by Hochschule für Gestaltung, Offenbach am Main.
- Gros, Jochen (1984): *Reporting Progress Through Product Language*, in: *innovation, The Journal of the Industrial Designers Society of America*, Spring 1984, p.10-11.
- Gros, Jochen (1987): *Grundlagen einer Theorie der Produktsprache. Symbolfunktionen*, edited by Hochschule für Gestaltung, Offenbach am Main.
- Katz, David (1961): *Gestaltpsychologie*, Schwabe, Basel, Stuttgart.
- Langer, Susanne K. (1963): *Philosophy in a New Key: Study in the Symbolism of Reason, Rite and Art*, Cambridge.
- Lorenzer, Alfred (1970): *Kritik des psychoanalytischen Symbolbegriffs*, Suhrkamp, Frankfurt am Main.
- Metzger, Wolfgang (1986): *Gestalt-Psychologie*, Kramer, Frankfurt am Main.
- Petroski, Henry (1992): *The Evolution of Useful Things*, Alfred A. Knopf, Inc. New York, USA.
- Press, Mike/ Cooper, Rachel (2003): *The Design Experience, The Role of Design and Designers in the Twenty-First Century*, Aldershot, Ashgate.
- Richardson, Adam (1993): *The Death of the Designer*, in: *Design Issues*, Vol. 9, No. 2, p. 34-42.
- Ritterfeld, Ute (1996): *Psychologie der Wohnästhetik: Wie es uns gefällt*, Beltz, Psychologie Verlags Union, Weinheim.
- Roy, Robin/ Wield, David (1986): *Product design and technological innovation: a reader*, Milton Keynes, Open University Press.
- Schulze, Gerhard (1997): *Steigerung und Ankunft. Über die Endlichkeit des Fortschritts*, in: Pierer, Heinrich v./ Oetinger, Bolko v. (eds.) (1997): *Wie kommt das Neue in die Welt?*, Carl Hanser Publisher, Munich, Vienna, p. 275-291.
- Schulze, Gerhard (2003): *Die beste aller Welten. Wohin bewegt sich die Gesellschaft im 21. Jahrhundert?*, Carl Hanser, Munich, Vienna.
- Selle, Gert (1997): *Altes oder Neues*, in: ders.: *Siebensachen, Ein Buch über die Dinge*, Campus, Frankfurt am Main.
- Sloterdijk, Peter (2005): *Goodbye Fortschritt*, in: Claassen, Utz, Hegrefe, Jürgen (eds.): *Das neue Denken, Das Neue denken*, Steidl, Göttingen.
- Steffen, Dagmar (2000): *Design als Produktsprache, Der Offenbacher Ansatz in Theorie und Praxis*, form Publisher, Frankfurt am Main.
- Williams, Gareth (2006): *The Furniture Machine. Furniture since 1990*, V&A Publications, Victoria and Albert Museum, London.

Acknowledgements: This research was funded by a grant from the Academy of Finland within the SeFun research project (Semiotic Product Functions, 2004 - 2007) at the UIAH. Sincerely, I would like to thank Dr. Susann Vihma for the precious opportunity to join the research project, for her kind interest in my work and her encouragement to undertake doctoral work.