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## **The Dysfunctionality of Everyday Things**

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**Designjournalen, 1/03, Stiftelsen svensk Industridesign 2003**



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# THE DYSFUNCTIONALITY OF EVERYDAY THINGS

## - ON STRESS, DESIGN AND ARTEFACTS

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### Abstract

This paper addresses the increasing issue of stress and burnout in contemporary society and attempts to connect this to product design. Stress can be defined as the reaction of a mismatch between the demands of the world and the needs and capacities of the individual. To what degree does technological products and design artefacts contribute to stress? Research shows that software that is unintelligible and difficult to use increase stress in users. But what are the criteria to be used when we design and evaluate products? The paper presents a survey on the relation between stress, relaxation and products. The answers are categorised and conclusions drawn about when and why artefacts stress us. How people cope with life reminds to a large extent on how they cope with products. Health sociologist Antonovsky has developed concepts for evaluating people's abilities to handle the strains of life, which he calls the "Sense of Coherence". The paper argues that this can be applied on products to give guidelines on why products stress us, and to create an understanding of how design can be used to increase relaxation. A special emphasis is placed on Antonovsky's concept Meaningfulness and how this applies in product design.

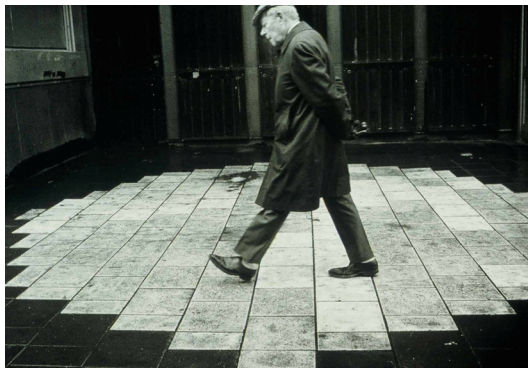
**Keywords:** Stress, Health, Product Design, Meaning, Aesthetics

### Background

In Sweden spring 2002, the cost for health insurance is increasing with 25 million skr (250 000 dollar) every single day. 33% of those health problems are caused by stress. Stress generates insomnia, weakens the immune system, increases the blood's ability to coagulate, increases the disruption of cortisol and adrenalin in the blood and gives rise, in turn, to a whole lot of stress related illnesses like stroke, insomnia, gastric ulcer, depression, back troubles and fatigue. Consequently, on the top list of medical prescriptions are sleeping pills, anti-depressives and sedatives, medicals that are related to stress and mental problems. These are indeed alarming figures and I am sure that most of you recognize some of those problems, even in you own life.

A general description of stress is when the demands of life don't match the capabilities and needs of the individual. When this happens, the person increases the mental and physical capacities as to adapt to this situation. The Canadian researcher Hans Seyle was the first person to talk about stress on biological systems in the 1930's. He called this initial reaction the *general adaptation syndrome*. The body makes itself ready for fight, escape or conflict, the heart rate and blood pressure increases and the muscles get tensed. But in most modern lives, problems are not easily solved by fight or flight and the high levels of adrenalin are of no use. Instead of solving the problem they make you sleep bad that night. This initial stress reaction passes by if the stressors disappear but if we are faced with another threat it returns.

Stress can be one of a kind event like a sudden death of a relative or it can be small, a constant friction that wear's us out over a long time. Our reactions at stress are developed to create opportunities to mobilise resources so that the individual will survive in a short term. This means that systems that are not important for our immediate survival will be disconnected, which doesn't harm us immediately, but might have serious consequences in the long run. A continuous stress condition affects the neuro-chemical balance in the brain that changes the size and ability of the brain cells. The Swedish physician Doctare [2] call this phenomenon Brain stress. Doctare have for a long time been working with war victims that suffer from Post Traumatic Stress Disorder, PTSD, and claims that it is essentially the same syndromes we see in stressed people in Sweden. After the initial reaction of energy mobilisation, comes a second phase called a *chronic* stress reaction. It appears after a prolonged or superior threat, when we see no way out. The body focuses on the survival of vital body organs. The heart beats slower, the blood leaves the limbs and muscles and centres in the inner organs. We get tired, cold, loses appetite and the muscles get tensed. If this state continues it can be developed to a state of chronic depression or burnout. Both depression and burnout are reactions to prolonged stress. Every other woman and every fourth man will, sometime in their lives, suffer from depression. The World Health Organisation (WHO) believes that depression, in addition to smoking, are the greatest health problems in the 20<sup>th</sup> Century and that depression will probably be the main cause of work related and functional disabilities amongst adults. [5]



*WHO claims that depression is one of the great threats to world health.*

Burnout is a kind of exhaustion depression caused by too much work and pressure over a long time and generally found within slimmed organisations in the Healthcare or IT sector. Since Burnout was made an official diagnose in Swedish medical care in 1998, the amount of people with burnout have increased with 300% each year. A recent study made on 67 Swedish women with burnout symptom [8] claims that stress gives the same brain damages as stroke. The central nerve systems is affected which substantially limits the brains normal ability to learn, remember and handle new information.

These women describe that they can't make the simplest decision or remember anything new

for even a short time. The course proceeds with increasing emotional reactions, chronic fear, anxiety, fatigue and a range of body symptoms. The writers conclude that we need to adapt working places for our brains as well as for our bodies. Work should be judged and adjusted to brain ergonomics to prevent cognitive overload.

There are many reasons for stress; some of them have to do with working conditions, some with the private life. Surely the reasons for stress are as complex and difficult to cope with as modern life and intrinsically a part of it. But something modern lives are full of, both at work and at home, are products.

### **Design and stress**

In his book *The design of everyday things*, Donald Norman [6] describes an event when he is in his room talking to a student. The telephone in his room starts to ring but he wants to finish his sentence before he answers the call. Then the ringing stops. Norman waits for the call to be transferred to his secretary, and hear the phone start ringing in her room. Then he realizes that it is past working hours. He rushes to her room to catch the call, but the phone is quiet. It

has been transferred again and he hears the telephone ring in the room next door. The door is looked and Norman rushes back to get the key but is of course too late. He hears the telephone start ringing down the hall. Was that still his call, mysteriously wandering a predetermined path in the building? How often do new technological systems really solve problem instead of creating new ones?



*When waiting calls at the tax administration reach over hundred it is so stressing to watch*

In a study I made at the Swedish tax administration I noticed that all the operators had post it notes on a particular place on the receiving unit. Beneath that post it note was the number of waiting incoming calls. When the number reached over a hundred (which it usually did) it was too stressful to watch, as the operators explained.

In a small company, of 50 employees, that worked up sheet metal, the production flow was very graspable and the amount of products few. When the IT system SAP/r3 was introduced on demands from a large customer 7,5 new people had to be employed to make the system work in production. Head of the engineering workshop and responsible for education of the system says: *“I used to tell the members: Don’t try to understand what you are doing. Just learn the commands and screens that are used, otherwise you go crazy”*. [11]

A product that do not work, or works in a way that is not in tune with how we live, causes stress. A buggy program, a lost key card or an unloaded battery to a cellular phone, are examples of things

that can be irritating and stressful. Taken one by one, these problems are manageable. But products do not come one by one, they come in herds. They invade our lives, homes, and cities. An average person has 2 000 objects in their home. All together they form the basic scenery of contemporary lives and societies.

Imagine a normal day in your life. How you wake up by the clock radio, get up take a shower, get dressed and make breakfast. You take the subway or the car to work, park it, get into your office and turn the computer on. How many products have you encountered so far in the first two hours in the day? Hundred? Two hundred? A thousand? And how many of these existed 100 years ago?

It might be difficult to answer but I think that we got the picture. We are surrounded by enormous amounts of product and most of these are very young compared to the age of human mind and culture. Is it not reasonable to think that this amount of products may in some way affect us? That they in fact create a basic stress level that constantly nag our adrenalin reserves and that makes us less resistant towards stress?

### **A questionnaire: stress and relaxation**

In order to better understand the relation between stress and artefacts I made a questionnaire. The goal was to see what made people stressed and what made them relaxed as well as what products were stressing and relaxing. Is there a connection between stressing situations and products? Which kind of products is stressing and which is relaxing?

The questionnaire was sent out to two organisations, one health centre in north of Stockholm and one big consultancy in IT-design and media, with several offices in the country. Most of the surveys were sent out and answered on email; some were distributed by hand and returned anonymously in a letterbox. About 40% of the employees answered, in total 43 people, 24 women and 19 men in the ages between 27 and 59.

After the background data (age, sex, profession) came four questions, two concerning stress and two concerning relaxation. The questions were to be answered on a blank space, where the respondents were free to make remarks or describe situations. There were no boxes with pre-decided answers to be filled in. This means that coherency in answers have a higher significance than in surveys with prewritten answers.

Despite the free modes of answering these were generally very coherent and it was easy to see the large pattern. By further analyses the answers could be organized into larger groups.

On first question “What makes you stressed?” the most common answer was:

- a) **Too much to do:** Too many emails, commitments, phone calls, meetings and projects.
- b) **Lack of control, powerlessness:** technology that does not work, computers, software, servers, unclear organisations, misunderstandings, delayed trains, other people. Spending a lot of time trying to fix these things with no success.
- c) **Disturbing audial and visual environments:** cell phones that ring during meetings and concentrated work, piles of papers, messy environment, irritating sound environments; printers, sound interfaces; things that do not fit in or can't be mended.

The next question was about what *artefacts* that cause stress.

Number one on the list comes computers and telephones. Other annoying artefacts that were mentioned several times are servers, printers, vacuum cleaners, cords, cars, car queues, alarm clocks and bills. Disturbing sound environments, things that are sorted but do not “fit in” anywhere; half important papers like information about ones pension or things that are broken and can not be mended.



*This untidy office interior contains a lot of stressing objects like computers, telephones, cables, printers and piles of papers.*

The third question was: What makes you relaxed? The answers on this were even more coherent than in the questions about stress. By far the most relaxing activity is listening to music, which was mentioned by half of the subjects.

- a) **Calming activities:** Sleeping, bathing, lying down, drinking alcohol, quiet and peace
- b) **Enjoyable activities without clear goal:** Listening to music, walking, being in nature, gardening, cooking, watching movies, sports, yoga, being with friends and family

- c) **Activities that gives (a sense of) control:** clean the desk, make what to do lists, finish jobs, back ups, sorting papers in folders, doing familiar things with well known objects, reading the morning paper. Repairing things. Having just enough to do.

The *artefacts* associated with relaxation were related to these themes mentioned above. Music was highest scored, followed by hot baths, beds and sofas, books, candles, musical instruments and kitchen tools. Cups with hot liquid, nice pictures; photos and a clean flat also made you feel good. Beautiful and functional things were mentioned, special glassware, a gardening tool or a familiar painting. Some people felt relaxed by survival kits, manuals, fire detectors, tools and extra batteries. One person mentioned his four year old server that enabled him to get hold of old files wherever he where in the world.

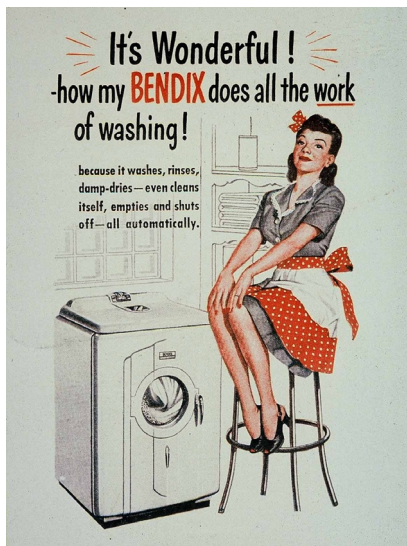
Differences between men and women were rather small. Women were more stressed by loosing control or of feeling powerless then the men were. Men on the other hand were more stressed by *other* people that were too slow, incapable, disrespectful or incompetent. More women mentioned problems to combine family with work.

It was no significant difference between the working places or different tasks except for one: all the secretaries, (three) were stressed by people that complain and whine about things that can't be changed.

### Coping strategies

In psychology, the way we deal with the strains of life are called coping strategies [3]. The way we handle products has a lot in common with how we handle life.

Coping strategies can be successful, which means that the troubles are dealt with and disappear or they can be less successful, the problems stay or get worse. Coping is a process that includes both problem solving and emotional reactions. Problem solving could be to take measures in order to influence or change the situation. The emotional reaction might be a defence reaction in order to handle a difficult situation or a direct reaction to the emotion. The most stressful situation is when you experience that you can't do *anything*; this is when many people are stroked by panic anxiety. Another useful concept from psychology is Locus of Control (LOC). It means to what degree a person experience that she/he is responsible for



*Does products make our lifes simpler or more complicated?*

what happens or whether it is outside his/her own control or understanding. To be able to control or influence one's own situation is crucial for mental well being. This is similar to the experiences reported about in the questionnaire above. The most stressing situations are the one's where you have no control or power to influence. Products that malfunction, a train that is delayed or telephones that keeps ringing.

In a report by the Swedish institute for Medical Evaluation (SBU) [10], 499 studies on treatments for depressions have been classified and evaluated. Through the large quantity of studies some general deductions can be made. The treatment with best result and longest lasting effect, was cognitive therapy where the patients learned new coping strategies. To summarize, these included strategies to help people to cope with feelings of meaninglessness, enhance feelings of control over one's life and finding strategies to handle the disease and its consequences. Other effective treatments are Psychotherapy and light

physical activity, for example walks in nature. Studies show that a mild depression gets better if the person takes a walk, three to four times a week for about one hour. Nature has a healing influence on stress, depression and general rehabilitation. It is also clear that people like to do things that they are good at and feel that they control. We enjoy our work because we are skilled at it and it gives us self-esteem to know that we can handle a difficult situation. Learning to master something new can also be tremendously rewarding. I think that everybody clearly remembers managing to cycle for the first time in their life. Coping strategies are usually looked at from a psychological point of view. But life has to a larger extent come to include the handling of technology and products. What are the coping strategies for technology? How much control do we have on the products that we use and live with?

### **Sense of Coherence**

The increasing unhealth in society is a cause of alarm but how do we define health? United Nation's definition of health is "A state of physical, mental and social well-being". Health sociologist Aaron Antonovsky [1] claims that with such a definition of health, everybody is ill. Health becomes equal to perfection, to the absence of any strains in life – and life, says Antonovsky includes inevitably adversities. Health and unhealth cannot be regarded as dichotomies but as a continuum where we are in constant movement from one side to another. A pathogenetic view looks for causes for the disease, whether it is bacteria, psychosocial or chemical factors. The salutogenetic view, advocated by Antonovsky, is interested in health and what can keep us healthy. Instead of focusing on the stressors we should think in terms of what keeps us moving towards the healthy side of the continuum.

When Antonovsky studied survivors from concentration camps he found that almost all of them suffered from Post Traumatic Stress Disorder. But the surprising thing was that some of them did not. They even regarded themselves as happy. This made Antonovsky become interested in why some people seem to be able to go through terrible hardships in life and stay well. Life is always full of strains, what is it that makes some people survive while others break down?

Antonovsky made several deep interviews and after years of research he could see a pattern consisting of three factors that he called Sense of Coherence. To optimise the chances of successful coping with a stressor, one must believe (1) that one *understands* the problem; (2) that one has at one's disposal the *resources* that are needed; and (3) one must *wish* to cope with the problem.

*Comprehensibility* – refers to the extent to which one perceives the stimuli that confront one, deriving from the internal and external environments, as making cognitive sense, as information that is ordered, consistent, structured and clear. Rather than as noise – chaotic, random, accidental, and inexplicable.

*Manageability* – the extent to which one perceives that resources are at one's disposal which are adequate to meet the demands posed by the stimuli that bombard one. If one has a high sense of manageability, one will not feel victimized by events or feel that life treats one unfairly.

*Meaningfulness* – the extent to which one feels that life makes sense emotionally. That at least some of the demands posed by life are worth investing energy in, are worthy of commitment and engagement.

Of these three concepts meaningfulness is the most important. You can go through almost anything if you feel that it is meaningful and that it will lead to something good in the end, something that is of emotional value for you. So a situation can be both impossible to understand and manage – as long as it is meaningful you can still survive. The other way around, a life that is easy to grasp and handle, but low on meaning, usually has a direction

towards ill health. If you don't wish to solve the problems that come up, the negative spiral begins. The first sign of a beginning depression or burnout is usually that everything seems meaningless.

### **Comprehensible, Manageable and Meaningful**

It is striking how well Antonovsky's concepts are applicable on our world of products. If we make a slight shift in focus of The Sense of Coherence towards artefacts this is how it reads; We optimise our chances for a successful interaction with an artefact if we believe that (1) we can *understand* the product; (2) that we have at our disposal the *resources* that are needed to handle it; and (3) if we *wish* to cope with the product.

Objects and places need to be Comprehensible, that is, you should *understand* what they are and how they work. It shouldn't be any doubts about the entrance to a building or how to turn the tape-recorder on. Products should appear coherent, structured, and logical and their function should be analogous to their appearance. If you perceive a product as logical and clear it is usually easy for you to find out how to use it. Something is *not* comprehensible when it appears chaotic, random, accidental or inexplicable. A product with high Comprehensibility supports understanding and makes it easy to remember how to use the product.



*The building to the right where I work is like a labyrinth, to understand the structure and find your way around is almost impossible.*

Manageability is about how you *handle* products. Objects have to be *Manageable* in the sense that you should know what to do to reach your goal, whether it concerns finding your way in the subway or sending a fax. If you don't know how to handle it, the information should be



easy to acquire and understand. An important aspect of Manageability is customisation. If a product does not suit you, you should be able to change so that it does. For example you should be able to change the height of the chair so it fits your size or change the contrast on the computer screen. If this is not possible the product is low on manageability. Many products that are mentioned as stressing in the questionnaire are low on both comprehensibility and manageability. When the computer hangs up, when the printer refuses to print or the emails can not be picked up, they drive us crazy because we do not understand *why* they do us this and *how* to handle it. It is now that we feel powerless and without control as many people mentioned in the questionnaire.

*A fire-extinguisher has to be extremely unambiguous and easy to manage.*

Some products are easy to grasp on a technical level but less easy on a mental and may provide no support for customisation, examples of that are timetables, calendars, door handles, stove-controls etc. Telephones are easy to grasp, they ring because somebody wants to get hold of you, but they are just as frustrating when we don't have the time to answer. Comprehensibility and Manageability are closely connected and need to be in an organic relation. The understanding and handling of a product are two sides of a coin. If you find your computer Comprehensible and logical you will no doubt find out how to solve a problem if you encounter one. But if your computer is an unsolved mystery that only causes you trouble and acts totally without logic, you might just leave the problem unsolved and find another way to get what you want.

The motivation for solving a problem is related to the last concept: *Meaningfulness*. If your computer is meaningful for you, or what you do on it is important, you will have the motivation to search for a solution to the problem even if you find it hard to understand. A product is *Meaningful* when it has emotional significance to you, when you *wish* to interact



*Music is a highly engaging, relaxing and meaningful activity. The goal of music is the activity in itself.*

with it. When it is part of something that you like and are motivated to do. When you invest energy and time in something it becomes meaningful to you: involvement creates meaning and this goes for products too. Something you have lived with for a long time, have repaired and taken care of becomes meaningful. Operational function does not *have* to be a prerequisite to meaningfulness but it often is. Something beautiful, or old and fable, can have an important social or emotional function

and meaning. Working in the garden, listening to music or taking walks is nothing that presents a “result” or that you

immediate benefit from, but they are the most relaxing, anti-stressing activities.

Meaningfulness is the most important component in Antonovsky's Sense of Coherence, but is something very rarely mentioned in product or IT design. Here is where we can find the motivational factor, that could help us cope with the stressors in products. That is the salutogenic approach according to Antonovsky.

## Conclusion

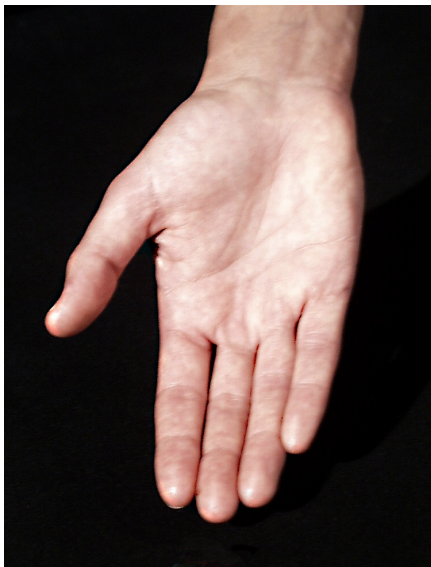
Technical products and IT-systems have for quite some time been found unintelligible and difficult to handle, which has been noticed by HCI researchers. But issues like extended functionality, efficiency and control are still at the core of the debate, and the questions of aesthetics and meaning have not entered the discussion. Criticising the narrow mindedness of HCI, Redström concludes, “*It is intriguing that a research discipline devoted to developing human centred systems has paid so little attention to aspects of use that falls outside a concern for increased productivity.*” [7]

Redström suggests a design philosophy for meaningful everyday computational things where *Presence* precedes use and *aesthetics* is seen as the basis for design. This suggests that both presence and aesthetics are aspects of meaningfulness. Fulfilling desires for food, drink, entertainment, shopping etc does not alone make you happy. Meaningfulness rather appears

when we *engage* in something. This makes us feel connected, committed and emotionally engaged.

In many languages there is a connection between meaning and the senses. In Spanish *Sentido* means both sense and meaning, in English we have sense and make sense. Human beings experience and understand the world through the senses. Aesthetics in the Greek meaning of the word refers to what *meets the senses* and is today widely understood as the total experience of a product.[4]

The basis for our aesthetical experiences is our life conditions, claims Roger Scruton [9] [4]. Our life depends on the aesthetical choices that we constantly make. Every day we make fast and yet precise judgements of a range of things like food, traffic, weather conditions etc. These choices are a prerequisite for life itself, claims Scruton, our ability to appreciate art is just a sublimation of that. Scruton's starting point is Kant's idea about the inherent structures of the human psyche that arranges our sensory inputs in categories and the idea from Gestalt psychology that we arrange these inputs in coherent meaningful "Gestalts". When we listen to an orchestra playing, what we *hear* are just sounds, what we *do* is to rearrange these sounds to a musical theme – a whole. Likewise what we *see* and *touch* when we use a product are just forms, what we *do* is that we create meaning out of the forms. When the world around us appears as random, chaotic and *incomprehensible* it is deprived of meaning. The process of making the world meaningful includes making it comprehensible and manageable. So aesthetics can be understood not as a way of making beautiful things, but an epistemology that helps us understand and interpret reality to make it meaningful. The key to create a world of artefacts that makes sense, both in the cognitive and emotional sense of the word, lies in aesthetics, the total experience of the product.



*To make the world meaningful is a process that includes active aesthetical judgements.*

The relaxing activities and products that the people report about are all activities that are done for the pleasure of it. No goals or rationality are behind a walk in the woods. Making cooking an efficient routine is but a way of taking away the pleasure. Repetitive activities like baking, ironing or mending tools are also rewarding and relaxing, but only if they are done in their own speed and with a visible result. The old, familiar and well known is also relaxing whereas recent products like computers, cell-phones, servers and printers are likely to stress us. How much has this to do with the fact that these products are new and difficult to grasp? There is nothing familiar and reassuring with a server. It might hang up any time and most people have no idea how to configure it. One woman writes: "The increasing amount of emails feels overwhelming and almost impossible to get rid of. I'm worried about missing important meetings and people get annoyed because they expect quick answers" The constant ringing of cell-phones in meetings and conversations is another annoying phenomena "

When I talk to somebody and their phone starts to ring, it feels like they don't really want to have this conversation. It is very frustrating" writes another woman.

Can we designers help in the process of making the new and distressing a well-known and familiar companion? Are there ways of making products that "affords" a long and loving

relation? Can we somehow slow down on the speed, allowing for pauses at work? Can we make things that are easy to grasp, easy to handle, possible to repair, beautiful and loyal as an old friend? The relaxing activities in the study are often slow, sensual and done alone; you're working with your hands in the garden, cook a meal or take a bath. Can some of these qualities be incorporated in products and IT systems to enhance our *wish* to interact with them?

There is a great need of increased comprehensibility and manageability when it comes to products but the greatest challenge of them all is to make the new technological artefacts a *meaningful* part in our life.

## References

- [1] Aaron Antonovsky, *Unraveling the mystery of health, how people manage stress and stay well*, Jossey-Bass, London 1987
- [2] Christina Doctare, *Hjärnstress- kan det drabba mig*, Runa Förlag 2000
- [3] Lazarus RS, Folkman S. *Stress, Appraisal and Coping*. New York: Springer 1984
- [4] Jerker Lundequist, Konst och teknik, *Dialoger*, 1999, 50-51, Trelleborg 1999
- [5] Murray and Lopez, *Global Mortality. Disability and the Contribution of Risk Factors*, Lancet 1997
- [6] Norman, *The Design of Everyday things*, Basic Books, New York 1988
- [7] Johan Redström, *Designing Everyday Computational things*. Doctoral Dissertation, departement of Informatics, Gotenborg University.
- [8] Rhodin-Nyström, Sandström, Lundberg, *Impaired Cognitive performanc e in patients with Chronic-Burnout Syndrome*, International Neuropsychological Society, Stockholm 2002
- [9] Roger Scruton, *The Aesthetics of architecture*, Princeton University Press, New York, 1979
- [10] *Behandling av personer med depressionssjukdomar*. SBU nr 3 1999, Stockholm
- [11] IT-kartan 2000. *En rapport om LO-medlemmars IT-användning*. LO 2000

## Author biography

Sara Ilstedt Hjelm received a MFA in Industrial design from Konstfack in Stockholm in 1991 and has been working as a consultant within industrial design, user interfaces and graphic design. She has developed and was head of the Design Engineer program at University college in Skövde as well as project leader for the education Material and Virtual Design at K3, Malmö University. She has published extensively in Design and Cultural magazines and has contributed to several books and exhibition catalogues. She is currently pursuing a PhD in Human Machine Interaction at the Royal Technical University (KTH) and works at Interactive Institute in Stockholm where she has been in the team that developed the award winning relaxation game "Brainball". Right now Sara Ilstedt Hjelm has focused on her research in design theory, interaction and health.

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