Emotional artifacts for fashion
– boosting personal relations to garments

BA thesis in interaction design
Author: Adam Danielsson
Supervisor: Amanda Bergknut
K3, Malmö University, spring semester 2008
1. ABSTRACT

I have in this project studied the area of personalized design as a way to create stronger bounds between artifacts and user. The way we relate to what we surround us with is important when we want to expose our personalities and tell who we really are. Today, in a world of mass-production, design and production seldom occurs at the same place. It feels like we are gliding away from the way we were connected to our things in the past. When we needed new cupboards for the kitchen, we went to the local carpenter and let him design and produce what we needed. The clothes were brought from travelling vendors, produced in the village or made by someone in your family, often with self-made yarn from the family farm’s sheep. We often had a connection to what we owned in another way than today. People knew exactly where their possessions came from, what material had been used and where that material had grown.

I have within this project investigated how to create that personal connection to an artifact and adapt it to the contemporary. To achieve this I have looked into the different kinds of invisible information that our bodies contain. Information that is produced by numerous processes all the time, which we may not think about. I’ve been studying how people react when their inner processes are visualized through usage tests, exhibitions and finally interviews.

The result is a concept I call Emotional Artifacts. The concept is describing how the idea of personalized fashion can be realized. A prototype has been built to show some of the possibilities with this kind of design that, with certain rules and ground sets, is generated by the user and later applied to different media.
# TABLE OF CONTENTS

1. Abstract .................................................................................................................... 2

2. Background .............................................................................................................. 4
   2.1. Problem statement ........................................................................................... 4
   2.2. Purpose ............................................................................................................... 4
   2.3. Delimitations .................................................................................................... 4

3. Context
   3.1. Relevant inputs ................................................................................................ 5
       3.1.1. The hunt for uniqueness .................................................................. 5
       3.1.2. Body as database ........................................................................... 9
       3.1.3. Bio art ............................................................................................ 16

4. Design framework .................................................................................................. 18

5. Design process ....................................................................................................... 20
   5.1. Give Life II ...................................................................................................... 21
       5.1.1. Setup ................................................................................................. 22
       5.1.2. Visitors getting personal ................................................................... 22
       5.1.3. Reflections on Give Life II ............................................................... 22
   5.2. The selection of data source and introduction of time .................................. 23
   5.3. Looking for the final output ............................................................................ 24
   5.4. Scenario ........................................................................................................... 27
   5.5. Final prototype: 1st iteration ...................................................................... 27
   5.6. Final prototype: 2nd iteration ...................................................................... 28
   5.7. Wearable emotions ......................................................................................... 28

6. Analysis ..................................................................................................................... 31
   6.1. Individualization and local trend ................................................................. 31
   6.2. Analysis of project approach ....................................................................... 31

7. Conclusion ............................................................................................................... 33

8. References ............................................................................................................... 34

Appendix: interviews ................................................................................................. 40
2. BACKGROUND

2.1 Problem statement
How can personalization of artifacts improve the relationship between person and products within fashion?

2.2 Purpose
The personalization trend is very strong. Many of us want to build up a personal identity and express our true selves through personalized and unique possessions. However, I find that most products, though aimed to be personalized, are still shallow and fail to speak to their users on a deeper level. This project will explore how to fill that gap and improve such relationships to be more emotionally connected.

2.3 Delimitations
A project with a broad theme like this has to be given limitations. The project invites for many different approaches and possibilities. The limits were set early in the project, where one crucial one was to have some kind of graphical output from the system. Partly since I have a background in graphic design, but also since a graphical output hardly sets any limits in how it can be applied to and create symbioses with products in different domains such as fashion.

My target group are persons who have a genuine interest in the arts and culture, keen to express themselves through personalization. Persons who, to experience an emotional relation to a product, need a deep relation to it that goes beyond just the visuals. They are curious and interested to attend and actively participate in the design process.
3. CONTEXT

This project explores an idea of generating personal, unique artifacts for use within fashion, and tries to establish an emotional connection through uniqueness and participation in the design process. Different inputs have affected the development of this project, where one of the main directions is emotional design. Inspiration from areas such as psychology, biometrics, art, interior design and fashion has helped in the development of conceptual ideas and prototypes.

3.1 Relevant inputs

Here I present inputs that are pertinent for this project. These inputs and thoughts create the foundation for which this project is built upon.

3.1.1 The hunt for uniqueness

\[
\text{I will not choose what many men desire,} \\
\text{Because I will not jump with common spirits} \\
\text{And rank me with the barbarous multitude}
\]

– Prince of Aragon, The merchant of Venice, Shakespeare

Like these words spoken by the Prince of Aragon in Shakespeare’s play, many consumers make choices and engage in behaviors designed to differentiate themselves from others. Similarity information plays an important role in people’s self theories. This can also be shown in clinical psychology, where e.g. one of Snyder’s (Professor of Psychology) clients suffered from fear of an imagined identical twin. This might be the driving force, on a subconscious level, behind the constant search for uniqueness. Elliott & Lemert define individualism:

\[
\text{The term “individualism” today conjures up an unusual, though sociologically revealing, diversity of associations. Ours is the era of identities individualized, and our current fascination for the making, reinvention and transformation of selves is, in some sense or another, integral to contemporary living.}
\]

The hunt for uniqueness is connected to how our society works. Being unique is rewarded. There are many situations that describe this phenomenon well, e.g. in competitions (the winner is unique) and how attractive it is to come up with new inventions and ideas, which often deal with problems

2. Snyder, 1992
3. Elliott & Lemert, 2006
in a new, unique way⁴. According to Snyder there is a connection between perceived similarity to other persons and emotional reactions to this. To be rewarded by society a person needs to be different, but not too different. This notion is described by Snyder as a function: Hypothesized emotional reactions as a function of similarity information (see figure 1).

This means that if we perceive ourselves to be slightly or moderately similar to another person we feel more positive than if we are not similar at all, or highly or very highly similar. Just as there are emotional reactions there are also behavioral reactions connected to these. Depending on if we are more or less than moderately similar to others we tend to change our similarity towards moderately similar (see figure 2).

Our identities are to a large extent defined by our possessions. Snyder states that commodities can serve as uniqueness attributes, thus scarce commodities would be very desirable for people who strive for being unique⁵. Snyder calls this a predicted Product Scarcity × Need for Uniqueness interaction. This seems like a never-ending cycle of being a unique consumer. As a certain product reaches the broader masses it is not unique anymore, having the consumer to look for other unique products. I think Snyder is really looking to the superficial here, and the establishment of short connections that does not really mean anything. Trying to be unique in this way is a constant endeavor to express one’s true nature. To have a true emotional connection to something, memories have to be involved. There can be a strong and emotional connection to a possession if it has a history one can relate to and thus has a deeper value. That kind of uniqueness cannot be replaced by a new product put on the market. The fact that memories enhance attachment is also argued by Schifferstein et al. in a study which investigates the consumer-product relationship. The study suggests that the designer “[...] should facilitate ways to form associations between the product and people, places or events (memories) [...]”⁶.

3.1.1.1 Back to the (modernized) roots

Product personalization is increasing in importance. Norman states that “we are all designers”⁷ – through our everyday actions:

Through our designs, we transform houses into homes, spaces into places, things into belongings. While we may not have any control over the design of the many objects we purchase, we do control which we select and, then, just how, where, and when they are to be used.

---

⁴ Snyder, 1992
⁵ ibid
⁶ Schifferstein et al., 2003
⁷ Norman, 2003
But to also control the design of what we purchase is an area of growth. The prosumer society is an indication of democratization of our economy, where people are used to actively contribute and feel that they are taking part in producing something. There may be both political and emotional values that spur this development, given from the notion that people miss the craft of hand and to produce something physically. An example of this is how the bakery mix products have evolved. It started out in the US by the company Betty Crocker\textsuperscript{8}. Their first product contained the requisite ingredients to bake a cake – all one had to do was to add water. The product was a total failure. The procedure was experienced as being too synthetic, the opposite to what it should feel like, and disregarded the emotional connection to baking by being too simple. Betty Crocker reassessed their idea and just made a minor change by letting the consumer add an egg to the mixture. The success was a fact. The egg, one of the most basic ingredients in baking, was enough to raise the emotional connection and make the consumer feel more immersed in the procedure. This example rises the question about to which extent we as designers should invite consumers in the design process, and shows the importance of testing a new concept on real users.

3.1.1.2 Individualist movement

The individualist movement can be seen in society by looking into trends as home-styling programmes on TV, personal trainers and personal shoppers in the big warehouses. There is a desire to stand out from the crowd with a style that is not only unique, but also expresses who you are. Today, when competition is present in all levels, the importance of being unique has also grown to be a condition for success in business as well as private.

So, why does the need for uniqueness increase? One reason may be how society works today and how many of us choose to live our lives, for which Rousseau, individualist and vagabond, was an early raw model\textsuperscript{9}. Sociologist Richard Sennett suggests that the traditional sense of mental security in family and home is on its way to loosen up and has changed into a constant readiness for adaption and flexibility, for as well spatial as mental alterations\textsuperscript{10}. The average American college student can during his working years expect to change job about eleven times, and change their skill base at least three times. Sennett argues that the globalization have disorientating effects on personal life. This is particularly due to how impermanent, contract work confuse the emotional, inner life.\textsuperscript{11} So, the way of living today is for many an expression of a paradox. While searching for the meaning with life through the endless available choices and trying to define ourselves,

---

\textsuperscript{8} Chew, T, 2007
\textsuperscript{9} http://history-world.org/rousseau.htm
\textsuperscript{10} Elliott & Lemert, 2006
\textsuperscript{11} ibid
we end up with a personality harder to define. If making a cross section of our experiences and identities, there will be a segmentet image instead of a solid shadow. However, the question is: which image is more fine tuned than the other? (See figure 3).

In home styling the personalization trend is very strong. Marianne Broddesson, a home styling expert, states that people do not buy the ready made solutions anymore but instead express their demands and personalities in their homes – a home should be characterized by the people who live there. New services emerge from this trend, e.g. the ability to frame our photos directly on the wall. Several companies are now offering personal wallpaper by printing customers’ own photos and graphics. The printing concept has started to broaden its bounds, and is no longer limited to the fixed size of a sheet of paper. Handheld inkjet printers which can print directly on any flat area such as walls and fabric has been developed and prototyped in various art projects, e.g. the Graffiti Printer project by Ariel Schlesinger, and is also trying to go commercial, e.g. the Xyron Design Runner. 3D printers will also find their way to home users. In about 5-15 years we will see models within an adequate price level, says CEO Evald Ottosson on Protech, a company who sells printers from Stratasys.

3.1.1.3 Cycle of fashion

Traditionally the cycle of fashion has started in the upper classes, and is by Simmel called the *trickle down* theory. During a cycle will, what was originally aesthetically innovative, *trickle down* to the broader masses and get copied and reproduced. Then the cycle starts over. But what might describe the youth fashion of today better, goes the other way around, and is described as the *bottom up* effect by Konig. Trends are caught up in the streets and *bubble up* to reach the designers’ catwalk. As Ekesiöö & Nygren put it:

*If fashion and style is showing a movement towards the importance of personal design, aware demand, needs for distinctiveness and consciousness for self-identity, then fashion and product supply should no longer be dominated by its creator.*

12 http://www.kvp.se/levabo/1.867619/ge-ditt-hem-en-personlig-touch
13 http://www.graffitiprinter.com/
15 http://www.idg.se/2.1085/1.123139
19 Ekesiöö & Nygren, 2006
3.1.2 Body as database

Aiming for creating artifacts that should establish a personal and emotional relation with its user, and looking into how such outputs could be generated, it lies near to investigate different sources of information that we all bear with us. Information that we are not necessarily aware of. As Dr. Ingeborg Reichle put it: “Identity is no longer limited to outer looks”20 – it is now time to reveal our inner looks. Our bodies are like large databases that contain a lot of invisible information. In this chapter I aim to present examples of such information that could be used as generative sources.

Searching for ways to capture bodily data, I found two domains that fetch such data for different purposes – biometrics and biofeedback. Biometrics is the study of techniques for determining the unique identities of humans based on physiological or behavioral characteristics21. The other realm is biofeedback, a treatment technique in which patients learn to control autonomous functions within their bodies.

Both domains can express uniqueness, but differently. The level of uniqueness in biometrics is clear. But the anonymous data retrieved from biofeedback can also express uniqueness – through revealing significant, individual traits.

3.1.2.1 Biometrics

Different characteristics and data that we bear with us can be used to identify a certain person. These include physiological features such as fingerprints, DNA, face recognition, iris scanning, and behavioral features, e.g. our signature, voice and how we tap the keys on a computer keyboard.

Biometrics are used for two major purposes: identification and verification. Identification is finding out who a person is by analyzing characteristic samples and trying to find a match in a database with records of people and their characteristics. It is commonly used in forensics and uses physiological biometrics. Verification is controlling if a person is who they pretend to be by recording specific characteristics and collate them against previous records for that person. It is often used for controlling access to restricted areas or information, and uses both physiological and behavioral biometrics.22

Physiological biometrics include23:

20 From Dr. Ingeborg Reichel’s speech on the conference Art and Biomedicine: Beyond the Body, Copenhagen, 2007-09-03
22 http://ctl.ncsc.dni.us/biomet%20web/BMOverview.html
23 http://ctl.ncsc.dni.us/biomet%20web/BMOverview.html
- Fingerprint – analyzing fingertip patterns
- Facial recognition – analyzing facial characteristics
- Hand geometry – analyzing hand shape
- Iris scan – analyzing features of the colored ring of the eye
- Retinal scan – analyzing blood vessels in the eye
- Vascular scan – analyzing vein patterns
- DNA – analyzing genetic markup

Behavioral biometrics include24:

- Signature – analyzing written signature
- Voice recognition – analyzing spoken word
- Keystroke - measuring time needed to type e.g. a password

**First form of biometrics**

Possibly the first form of biometrics in practice was finger printing25. Artifacts in Europe and Asia tell us that fingerprints were used to seal contracts and sign legal documents already in ancient history. In 14th century Persia, where they used fingerprints on government papers, a government doctor observed that no two fingerprints were exactly alike26. The unique patterns of whorls and lines have then been examined by various scientists, but the first published paper that discusses how they can be used to identify individuals was written in 1823 by Dr Henry Faulds27.

Before computerization forensics used a number of different classification systems that described how fingerprints should be analyzed, identifying certain types of structures and formations built up by friction ridges recurring in all fingerprints. But renewing old techniques may lead to new interesting art projects. One of the latest inventions in detecting fingerprints is to measure the electrical potential at pre-set intervals over the object to be examined. This allows examining metallic and curved objects with better results. The data collected by the scanning Kelvin probe is then used to render high quality 3D images of the fingerprint28. Such a render looks like a fantastic mountain landscape, a landscape unique for a certain person (see figure 9). The connection between fingerprint and landscape was also

---

24 ibid
25 http://ctl.ncsc.dni.us/biomet%20web/BMHistory.html
26 http://fingerprints4u.com/fingerprint_facts.html
27 http://en.wikipedia.org/wiki/Fingerprint
28 http://www.swan.ac.uk/engineering/Research/MaterialsResearchCentre/ResearchAreas/CorrosionandCoatings/Forensicfingerprint/
implemented by Futurefarmers in 2004 in a project called Fingerprint Maze (presented later).

Besides identifying a person, fingerprints can also tell much about its bearer's life. Even if the information is quite vague, they can give hints about e.g. a person's origin and food habits. Anthropologists in Rome have reconstructed Leonardo da Vinci's left index fingerprint which, they say, can help attribute paintings and also give clues about what he ate and whether his mother was of Arabic origin. Such information can bring us closer to historical persons.

**Biometrics goes emotional**

Fingerprints are also sometimes used in hand analysis to tell who you are at a deeper level. In “Lifeprints: Deciphering Your Life Purpose from Your Fingerprints”, Richard Unger reveals his theories in how we can understand our goals in life and what we are meant to do during our time on Earth. If fingerprint analysis tell us who we are meant to be from the beginning, reading our palms tell us how we live our lives right now. Apart from our fingerprints, hand shapes and all other lines change over time. So, it would be interesting to make prints of one's palm regularly over a long time. From those images it would be possible to see how a person's way of life has changed during this period. This information gets personal in another way than fingerprints. Fingerprints are your watermark, but your palms are reflections of your life at certain points – some kind of generative time stamps.

**Biometrics in graphics and arts**

A fingerprint is like a unique piece of art in itself, and has been widely adopted as an element in the arts. One can think of it as an individual code embodied in beautiful shapes that can be seen with the naked eye. But the fact that they can be seen without any interpretation or magnification might result, when it comes to art, to artifacts that are not that compelling and interesting but often quite obvious and reproduced.

DNA 11 is a company specialized in offering personal art products based on a client's DNA or fingerprint. A DNA print is made from a cheek cell swab that is collected with a provided swab and posted to DNA 11. Fingerprints are collected using a special fingerprint collection kit, then scanned, refined, and printed on canvas. Here they are using the actual image of your fingerprint as it is, not trying to gather data from it to generate something.

---

31 [http://www.amazon.com/dp/1580911854/?tag=handanalonli-20&camp=14573&creative=327641&linkCode=as1&creativeASIN=1580911854&adid=0AXM9Z5XD6YDBWRAVEF&](http://www.amazon.com/dp/1580911854/?tag=handanalonli-20&camp=14573&creative=327641&linkCode=as1&creativeASIN=1580911854&adid=0AXM9Z5XD6YDBWRAVEF&)
else. This makes me think of the time in nursery school, drawing funny figures with fingerprints as central elements.

Their DNA prints are also resembling the typical image representation of DNA as one knows it. Probably the first implementation of bringing images of DNA into the art scene was the artist Iñigo Manglano-Ovalle. When an art patron asked him to make a portrait of her husband for his birthday, Ovalle conspired with the husband’s barber to collect some hair from the man’s head. The samples were then sent to a forensic laboratory to extract the DNA, which resulted in Clandestine Portrait.³³ Ovalle described the process:

“The bands, now an infinitesimal measure of the patrons’s genetic semblance… were scanned into the artist’s computer where he proceeded, much like a barber would, to trim, tidy and embellish the patron’s likeness.”³⁴

Ovalle’s next implementation of DNA art was his installation The Garden of Delights (1998), which is focusing on people’s real identities. From DNA images it is impossible to tell if two individuals are genetically related, even if these images are alike. It is said that the work is a critique on the classification of human by race or physical characteristics and argues that our true identities lie in our DNA.³⁵

Using individual data such as DNA or fingerprints also raises ethical questions. Many people are concerned by letting private companies store their genetic information. Bird is addressing this issue when commenting My DNA Fragrance, a fragrance that is made exclusively from one’s own DNA:

“The proliferation of this type of product, likely to continue as consumers look for individuality in a world of mass produced consumer goods, emphasizes the need for extensive legislation on the security of personal genetic information.”³⁶

Fingerprints have also been used in works of art where they become, together with other graphical elements, a representation of a person. Artist Claus Miller made his first fingerprint based work of art in 1990.³⁷ He is using a fingerprint’s actual image, but combines it with other elements. Prior to an exhibition he had in 2006-07, “SignsForPeace”, famous people were asked to donate their fingerprints.

³³ Andrews in Kac, 2007
³⁵ http://www.jdwelch.net/writing/manglano.html, 2008.01.29; Andrews in Kac, 2007
There have been a few projects attempting to make three-dimensional versions of fingerprints. Futurefarmers project “Fingerprint Maze” (2004) lets a person scan his/her fingerprint through a setup of a prism, a macro photographic lens and a webcam. The image is then processed and transformed into a 3D labyrinth in which one can wander through. They describe their creation as "something between copy machine art and generative architecture".38

The portrait artist Kevin Clarke portrays his subjects – usually other artists – by using the alphabetical letters of their DNA sequence as a way to express their individuality, their essential, underlying selves.39 Over an image that he associates with his subjects (perhaps one of their paintings), Clarke draws the sequence of the letters ACGT that represent the four amino acids that are the basis of a person’s genetic code. In these portraits Clarke is searching to define the essence of the individual. As he puts it:

“What moves me is the confluence of notions of individuality, language, physicality, and the development of a codex to describe a most elusive reality.” The DNA sequence, to Clarke, is “the invisible made visible through an apparently simple genetic alphabet.”40

Neurotopographics is a project where neuroscientist Dr Hugo Spiers, artist Antoni Malinowski and architect Bettina Visman have collaborated over a year and researched how special cells in our brains provide us with a mental map and let us navigate in space. Bettina Visman finds the correlation between what happens in the brain and the physical nature of space and spatial navigation fascinating, and suggests that this not only inspire the design process but also inform how architectural spaces may be organized.41

Combining science with other disciplines not only open up for discussion and understanding among the public, but also enables development of new concepts which reuse techniques in somewhat unpredicted contexts and for new purposes. When it comes to creating unique spaces and artifacts (for the individual), combining science with art and design can reveal new patterns and ways of designing that feel unpredicted yet familiar and natural by making use of the subconscious, complex information we all bear within us. Designing for the individualistic world may need these kinds of tools.

39 Andrews in Kac, 2007
40 http://www.encyclopedia.com/doc/1G1-18299593.html
41 http://www.wellcome.ac.uk/doc_WTX042816.html
3.1.2.2 Biofeedback

Biofeedback, which has evolved from early laboratory research in the 1940's\textsuperscript{42}, is an alternative treatment technique in which patients are getting information about activities within their bodies. In the 1950's and 1960's biofeedback was studied by researchers from different fields to find various applications to modify psychological functions in humans and animals.\textsuperscript{43} The term biofeedback was first used in the late 1960's to describe this technique.

Not too long ago, the ability to in any way control autonomous bodily functions was considered to be totally impossible. Such behavior was subordinated by the subconscious, a part of the brain activity to which we had no access on a conscious level. However, such conceptions was later fought by scientists arguing from the opposite direction. Humans could be trained to produce alpha brain waves, and laboratory mice were trained to alter their blood pressure, heart beat and blood flows to certain parts of their bodies\textsuperscript{44}.

Biofeedback is now widely accepted as a relaxation technique, but can also cure other physical and psychological disorders, including paralyzed or spastic muscles, migraine headache, tension headaches and other types of pain, high and low blood pressure, cardiac arrhythmias, epilepsy and paralysis.\textsuperscript{45} Bodily information recorded by different kinds of sensors are fed back to the patient in real-time, often represented in abstract ways with graphics and sounds. The patient is then trained to reach certain results just with help of the mind. What is interesting is that this kind of treatment transfers much of the responsibility from the doctor over to the patient. Even if such biofeedback sessions are just part of a larger treatment programme for a patient, it truly helps to involve and encourage the patient to focus and work with their mind in positive ways, which most certainly has an important effect on whether to get better.

Biofeedback instrumentation includes:

- Blood pressure
- Pulse
- Skin temperature
- GSR – Galvanic Skin Response, measuring electrical resistance in the skin

\textsuperscript{42} http://www.healthandhealingny.org/complement/bio\_history.html
\textsuperscript{43} ibid
\textsuperscript{44} Shealy, 2001
\textsuperscript{45} http://psychotherapy.com/bio.html
EEG – Electroencephalography, measuring electrical activity produced by the brain

HEG – Electroencephalography, measuring neural activity in the brain

EMG – Electromyography, measuring muscle tension

Biofeedback has also found its way to the commercial market for home use (e.g. http://www.biocomtech.com/products/consumer). Today there are several products out there which offer monitoring of different bodily functions. They often implement the measuring of skin temperature, galvanic skin response and heart rate, which the user is invited to try to control with help of different feedback outputs. Such products can often be connected to a computer in order to get rich visual and auditory feedback. The Journey to Wild Divine is a computer game in which the player is using bodily functions for interaction:

"Navigate through a realm of enchanting beauty as you wander through mountain tops, waterfalls and sumptuous gardens. Throughout this game you’ll practice breathing and meditation techniques, like the heart breath, an ancient yogic breathing technique that will help you achieve control over your mind & body to help reduce stress and improve physical and mental wellness."

It comes natural that computer games start to implement biofeedback, since it in its simplest form already is a kind of interactive system. Also, since computer games are trying to involve and absorb the player, using bodily functions ought to further enhance the connection between player and game on an emotional level. Artist Steve Lambert created an arcade style video game called Simmer Down Sprinter. It’s a two player game in which the players compete by moving two runners around a track. The avatars’ speed are directly limited by each player’s measured stress level: the higher stress level, the slower the avatar runs. Steve Lampert describe it as a game about competitive relaxation.

Research within BCI (Brain-Computer Interaction) has proved that it is possible to use EEG signals for interacting with software and games. Now, the first commercial BMI (Brain Machine Interface) device will be released by the company Emotiv Systems. The device, in shape of a helmet, makes it possible for games to be controlled by a player’s mind. 

47 http://visitsteve.com/work/simmer-down-sprinter/
48 http://www.emotiv.com/2_0/2_2.htm
The connection between psychology and art is clearly evident in the work of Bill Scott called Brain Paint\(^49\). It is a project where patients are treated by learning to control their brain waves. The complex information retrieved from the sensors, mounted on a patient’s head, is transformed into mathematical fractals morphing and displayed through VR googles.

Who we are as persons can often, to a large extent, be defined from which activities we enjoy. In the project “Functional Portraits”, artist Marta de Menezes is experimenting with fMRI (functional magnetic resonance imaging). With that technique she is capturing the brain activity of a subject while performing a task that characterizes herself or himself. Her next step in this project is to manipulate the brain activity in order to create desired images. By planning a set of tasks it would be possible to paint a certain set of images.\(^50\)

### 3.1.3 Bio art

When talking about generative systems and art today it’s hard not to mention the growing area of bio art. This subject is often misinterpreted when it comes to defining what it really is. Every new medium is created by combining, refining and developing other mediums. This is also the case with bio art, which is a new art form that has emerged from the cultural impact and increasing accessibility of contemporary biotechnology\(^51\).

Bio art takes on all possibilities that the combination of biotechnology and art offers. It can visualize processes to the public in a more understandable and accessible way. There is often some kind of critical message in bio art works, and can make subjects more understandable and open up for discussion around provocative subjects such as gene modification. It manipulates processes of life by creating or transforming real life forms. It is interesting that a bio art installation often mimics life in its own way and that it changes over time. Given that a piece of art can reproduce itself it can exist as long there is life on earth and gets part of evolution.

Bio art can be a powerful political tool. On the conference Art and Biomedicine – Beyond the Body in Copenhagen 2007, Steve Kurtz presented his Critical Art Ensemble. The Critical Art Ensemble is a collective of five artists who explore the intersections between art, technology, radical politics, and critical theory. Steve Kurtz, one of the artists, calls himself a bio artist, and makes very clear that he is not a scientist even though he has quite deep scientific skills. One of the projects he organized, called “Marching Plague”, brings up

---

49 http://brainpaint.com/
50 http://www.martademenezes.com/
51 Eduardo Kac, 2007
a discussion about biological warfare and investigates what the potential risks are. This was carried out by spreading a harmless bacteria over open water toward a floating platform holding 30 guinea pigs. The result was that only one animal was hit by the spray and none were infected. The project mocks the belief that biological terror is a serious practical threat. In this way, bio art is a strong tool to bring up discussions and questions. What is the truth? Artists and society can make scientists remember that science in itself is not a perfect discipline.

Steve Kurtz’s goal is to bring us back to a more democratic civil space. He brings up important and controversial subjects and presents them in new ways which are more accessible and understandable to the public. This is also practiced in his project which addresses genetically modified food. To what extent is the food we buy all natural? Can we trust the labels? The result from the project revealed that genetically modified food is not genuine at all. Especially in Austria, where a very large percent of the food tested had been genetically modified.

52 http://www.counterpunch.org/cox07132006.html
53 Steve Kurtz’s speech on the conference Art and Biomedicine: Beyond the Body, Copenhagen, 2007-09-03
54 ibid
4. DESIGN FRAMEWORK

This project is all about creating something unique and personal for a specific individual. Or, more specifically, creating a connectivity and close relation to an artifact. The underlying paradigm here are the theories of emotive design.

As noted by Marco van Hout on Design & Emotion, emotional design can take much inspiration and help from evolutionary design when designing products and services that get as close to us as possible. Taking inspiration from nature is common in many design realms, and when referred to emotional design it is interesting to think about e.g. natural elements that draw attention and maybe also announce some kind of danger. Dr. Patrick W. Jordan, an international design and marketing consultant specialized in emotional design, gives his thoughts on evolutionary design:

“[…]the human brain is hardwired to respond to particular shapes with a heightened sense of awareness, particularly things that are dangerous to us like snakes and spiders. Because of this, so the theory goes, things that borrow form elements from these things will grab our attention. A classic example of this is Alessi’s spider-like citrus-press that was designed by Philippe Starke.”

He also mentions how the use of color can rise the attention and provoke fear. An example here is the combination of yellow and black which express warning in an effective manner. So, incorporating the ideas of evolitional design into emotional design suggests that this project formulates its artifact as something with a strong organic feeling. This is also augmented by the fact that I tend to extract biological information from involved participants, thus an output which reflects these values figuratively comes as a natural design decision.

Pieter Desmet, whose PhD research focused on emotional product design, states in an interview that the emotion experienced with a product at a certain time is the result of the holistic thinking around the product or service. Everything connected to the product is involved in telling the story. Desmet compares it with reading a book:

“[The emotions experienced at any point of time are not just elicited by the particular page one is reading, but by all previous pages that have already been read.”

55 http://www.design-emotion.com/2006/12/04/getting-emotional-with-pat-jordan/
56 ibid
This is very important for my project. In the end, when someone wears a garment with graphics generated from her body, that should elicit a kind of instantaneous emotion that is established during the process that resulted in this artifact.

Desmet defines emotion to be the result of the connection between a person and a particular object. This object may not be the product itself, but can also be some related object, event or person. Desmet exemplifies this with fascination vs. inspiration. One can get fascinated by the design of a new bicycle concept (the object is the bicycle), or get inspired at the sight of a backpack which recalls to them a certain backcountry experience (the object is the associated memory). This dividing is often true, but the two aspects are equally often merged. To be captivated by the design of a product which also evokes divine memories and mental images of oneself riding the bicycle through the backcountry, is what most product designers want the consumer to experience. I want to combine these two angles and integrate them into my design. Addressing my target group (see chapter 2.3), it is important that the attractiveness is composed by addressing emotion through both aesthetic and deeper personal values.

58 Desmet, 2003
5. DESIGN PROCESS

The design process will be built up around addressing a number of defined key values (see below) that I consider need to be fulfilled in order to succeed with this project. This is carried out by building prototypes, holding exhibitions and conducting usage tests, followed by evaluations measuring how each value has been fulfilled. This is used as a tool to figure out what needs to be improved in the next iteration. Since this is an illustrative and explaining study, I am not carrying out any quantitative surveys. Instead, a qualitative survey is conducted through interviews with my test persons who try the final prototype in a real-life scenario.

Addressing my problem statement (see chapter 2.1), I used my inputs from relevant theories presented in chapter 3. The four key values that I considered must be fulfilled in order to succeed with this project:

A. **Emotiveness:** I want to create an emotional connection between artifact and person. In order for a personalization to improve the relationship to a product, emotions need to be awakened. Emotional design is a corner stone in fulfilling my target groups’ demands. The individualist movement, which is a present element throughout this project, can be seen as a reaction against a confused emotional, inner life (see chapter 3.1.1.2). Thus, emotiveness is a significant value to use when evaluating my prototypes.

B. **Generativeness:** the output should be generative, so the user can contribute in the process. As Ekesiöö & Nygren state (see chapter 3.1.1.3), if we go towards a development where personal design and aware demand is growing in importance, we must invite the consumer to be a part of the design process. Letting users affect generative elements should be a great way to accomplish this.

C. **Mystiqueness:** the process must be exciting in order to gain interest. This is an element that I consider many commercial implementations of art generated from biological data is lacking – they tend to be just brought out from the science lab into the art scene, being too concrete. To work with the mystiqueness factor is to work with how the whole process is experienced, and is important as to gain involvement from people.

D. **Uniqueness:** the output must be unique to its user so that the interest remains. The uniqueness factor is tightly connected with the emotiveness factor. If a product has a history and holds deeper values one can relate to, that will create a uniqueness able to breed true emotional connections (see chapter 3.1.1).
In reality, and as you can read from the lines above, all these four values are tightly connected and often depend on one another in order to be fulfilled.

5.1 Give Life II

In 2006 I made an interactive art installation exhibited in Malmö, Sweden, called Give Life. The installation acted as a metaphor for sharing your own energy to someone else who really/urgently needs your help. One can think of a diseased person or someone wounded in an accident, where you give first aid, or acts preventative by giving blood to a blood central. The installation measures the visitor’s pulse, which gives life to a projected heart which starts to beat at the same rate as the visitor’s heart.

Give Life functioned well in communicating the message of expressing bodily data by visualizing it through another medium. If putting Give Life into the context of my key values, value B: Generativeness, and partly value C: Mystiqueness, were fulfilled. So, as a starting point I considered Give Life would suit well for a first usage test, given that some modifications were made. Looking to the defined key values, two of them were most critical to improve: value A: Emotiveness and value D: Uniqueness.

I thought about Uniqueness in the context of extending Give Life, and laid out three different types of meaning it may hold when it comes to personalizing an artifact.

- “This is me” – an individual’s generated pattern can be distinguished from others’ and is recognized with ease.

- “This was generated by me” where one has to know that this was the case. It is unique in its form but may still be hard to recognize among other artifacts developed by the same system.

- “I took part in creating this” where the result is not necessarily unique in its form, but may still be unique for the individual. Here the whole connection is settled while generating the artifact and later totally laid upon.

Looking to the characteristics of Give Life it was the third aspect of uniqueness that was going to be presented by the modified installation. The uniqueness factor was reinforced by adding color as a generative element. The color would now vary between blue and red reflecting a visitor’s current pulse. Regarding value A: Emotiveness, I wanted to enrich and extend it over time by providing the ability to create an enduring artifact, something not only visible in real-time. This was implemented by letting visitors render and save still images directly from the projection. Images could then be ordered and printed on high quality art paper. In addition, sound effects
were also added to the setup. Give Live II was exhibited in Borås, Sweden in May, 2007.

5.1.1 Setup
Visitors were free to make a snapshot at any time by pressing a button, whereafter two versions of the image were saved: one PDF were rendered to use for print, and one jpg version were saved to add to the slideshow of all images saved so far during the day. The slideshow presented those images together with a date and time stamp. Visitors could browse through the slideshow when choosing which image to order as print.

5.1.2 Visitors getting personal
One question I asked myself at the prospect of the exhibition was whether visitors would feel a personal and emotional connection to the resulting images, given that value D: Uniqueness was addressed by the third type of personalized artifact above. Clear was that the installation drew attention and people approaching it were very curious. They tried it out and experimented by altering their pulses to get divergent results and normally saved 3-4 different alternatives to choose from later. Worth noticing is that a few people first felt a bit inhibited in approaching the installation and putting their finger into the sensor, e.g. due to fear that the system would detect if they had a heart failure and also display that to all other visitors on the exhibition. But after explaining that there was no such medical features and after watching others interacting with it, there were only one person during the two-day exhibition who did not want to try.

What was quite remarkable was that there were many visitors who got very emotional while watching and participating in the installation. I was entrusted many personal anecdotes, a behavior apparently induced by the nature of the installation. One lady told me about her heart diseased daughter-in-law who were put in hospital and had just been through surgery and on her way to get better. She was puzzled by whether it would be appropriate to give her a print generated from her own heart as a symbolic gift. She was very touched. What was common among couples and families was the idea of letting each one create their own picture, and then have them printed and hung up together on a wall.

After the exhibition the orders were printed and delivered.

5.1.3 Reflections on Give Life II
Learning from the experiences with Give Life II, I could make certain conclusions about how people reacted to this kind of experience. To the apprehension that the value D: Uniqueness, would hardly be touched at all, the opposite was proven. Knowing that one physically had taken part in the
A generative process was for many a factor that made the whole experience feel unique, and also laid ground for an emotional connection to the work. The fact that some visitors actually ordered prints also proved the level of interest. Worth noting is that I also offered ready-made prints previously generated from me, but these came more to act as an example and were neglected in favour of the ability to create own ones.

5.2 The selection of data source and introduction of time

Now, what really had to be improved, was value D: Uniqueness. Even though Give Life II had started to touch this value, it had to be improved a lot.

As noted earlier, memories can help to establish a connection between person and product. Memories can be brought up in many ways – taking photos or recording video are common ways to document the moment which will later help in remembering that point in time. In no time a picture will take us to that when and where. Targeting for emotional connection between person and artifact led me to look into what can otherwise remind us about memories, and was thinking about invisible things hidden from cameras and microphones. I was looking for information that could reveal emotional states with the purpose to enrich a memory. Such information would have to be measured with some kind of sensor and interpreted and translated through audial or visual means. The data could be as a snapshot, capturing that very second in life resembling the function of a still image camera. But if the dimension of elapsed time is added we would have a recording of emotional states, resulting in a series of “snapshots” or an interpreted curve.

Regarding how to read such kind of data, I saw two aspiring alternatives for measuring emotional states, both in the area of biofeedback: EEG (Electroencephalography, method for measuring the electrical activity produced by the brain) and GSR (galvanic skin response, method of measuring the electrical resistance of the skin). I disregarded EEG and its complex nature of data in favour of GSR. GSR offers the possibility of reading a person’s stress level, and such a technique could be built into a portable solution for both stationary and mobile data capturing, which was essential for the kind of usage tests I wanted to conduct. I also had to investigate if the technique made sense for generative purposes.

A number of different GSR circuits were built and tested, of which one proved to work as desired. Initially I wanted to study how the sensor worked in terms of biofeedback, if people by some means could learn and become aware of the inner processes that the sensor revealed. A game-like appli-

---

59 GSR circuit from http://web.media.mit.edu/~msung/VitaMon/vitamonschematics.htm
60 Finger electrode design from http://www.extremenxt.com/gsch.htm
cation was designed to carry this out. The signal was read and fed into the software, which interpreted the data and displayed an animated avatar who reflected a person's stress level through different poses. Each test session was limited by time, and a "player" gained more points the longer a relaxed state of mind could be obtained.

This application worked as to test how well the sensor worked and if it made sense. Tests were conducted on four persons in the age of 27 to 58. Results showed that it was possible to increase the stress level by interfering with external/surrounding means, e.g. let the telephone ring or talking with the subject. However, the time needed to get back to a relaxed state differed between subjects. This has probably to do with differences in sweat gland behavior. The main purpose with this exercise was to see how well the sensor worked, and it proved to function very well.

For the next test, I wanted to include time and build a portable solution. Thus a data logging solution had to be implemented, which was conducted by adding a USB memory to the hardware circuit. The idea here was to be able to carry the device during a special occasion, e.g. a daughter's wedding. It would act as an emotion recorder. Later, when looking at an artifact generated from these data, the ambition is to bring the person back to that when and where. However, I found that due to the sensitivity of the electrodes, it is hard to get reliable data when one is moving. They do not allow much finger motion in order to stay sharp. This can be seen in figure 23, which represents the GSR data log from me watching a movie.

5.3 Looking for the final output

Looking for an output in the form of an artifact with flexible qualities, I decided to use graphics as the media for expression. One could also imagine some kind of physical artifacts, but that would drastically narrow the area of

---

61 My prototypes are utilizing Arduino:
http://www.arduino.cc/
and Processing:
http://processing.org/

62 Article about writing data to a USB memory stick:
http://www.arduino.cc/playground/Main/UsbMemory
possible uses. Instead, graphics is a fantastic output in that it, theoretically, can be applied to any surface, and therefore opens up for a wide range of possible applications. As described in my design framework, the graphics to be developed should communicate a strong organic feeling. It should resemble an organism or a system of multiple smaller organisms forming a greater whole.

Instinctively the resemblance of tissue came to mind. Also, I found the structure of elastic fibers very interesting and wanted to create something that is layered of thin threads, organized in patterns by affecting each other in different ways. The artistic work of Casey Reas is very inspiring. He often starts out with underlying mechanics that are made up by simple instructions which, when incorporating a large number of objects, create a highly complex system with organic qualities. Sketches were both hand drawn and programmed to develop a system that had the visual qualities strived for. Since I was looking for unique looks expressed through a shared language, the generative aspect was also very important.
What I found out from my tissue-like sketches was that such underlying structure was not really suitable for the kind of reflection I sought for. It works well for systems that are self-generative, but when combined with data captured and analyzed over a certain time, the risk is that the connection between data and structural rules do not make sense and may be hard to establish. Also, I wanted a graphical language that spoke through a coherent shape easy to recognize, rather than a microscopic detail of a greater whole (which an image of tissue symbolizes). Thus, still with layers and threads in the mental image, but now trying to create complete symbolic bodies from them, the direction towards a more affectable algorithm was embraced. The mental image was extended to include the way flowers are built up with layered leaves, and how to have the whole structure working together and resemblance a living organism.

I sketched out how the data captured by the GSR sensor could be analyzed and interpreted. While measuring, values were saved every two seconds. The data was studied and seven different factors were extracted which could all be implemented and used to affect the graphical output: frequency, min value, max value, difference (max-min), average value, start value, end value.

The continuous curve symbolizes the measured period, thus it was chosen as a starting point for generating the graphical output. The curve would not be visible in the sense that it is drawn out, but instead becomes a magnetic field by being equipped with a number of magnetic points. The number of points is determined by the frequency. How the curve is positioned in the plane is also determined by the frequency.

![Figure 29](image1.png) **Figure 29** Model of drawing structure. 1: curve representing GSR data over a period of time. 2: magnetic point. 3: moving cell.

![Figure 27](image2.png) **Figure 27** Inspiration: thread-like, layered leaves on flowers.

![Figure 28](image3.png) **Figure 28** Inspiration: the layered shell on shrimps.

![Figure 30](image4.png) **Figure 30** An output from the new algorithm.
5.4 Scenario
Finishing up the visual language the fusion of hardware, software and context was about to take place. Two scenarios were sketched out. The first one is describing how a recording over a long-lasting period of time could be carried out and gives an example of a possible purpose. It may be that a special occasion is expected when one would like to record the inner emotions during that day. The second scenario is describing how such a service could become available in e.g. a design store, where one can create a pattern instantly and also decide how and where to use the artifact. In this project I decided to implement the latter approach, which might be the most likely to be carried out in a real-life situation:

Imagine going to a design store who is offering the ability to create personal, unique patterns, generated from the body. Once there, you decide that you would like to try it out, and you are led to a calm, secluded corner where the generative process will take place. You sit down and attach the measuring electrodes to your fingers, after which the scanning procedure starts. The system is now measuring your stress level, which you are invited to try to alter. To help you with that, you can choose from a variety of sound loops – relaxing tunes or uptempo beats – through a graphical or physical interface. Such a scanning session would presumably take a few minutes to complete. When the reading is finished, a graphical representation of the collected data is developed and displayed on a screen.

Now you would like to apply this artifact to a garment. You can choose from a range of pre-designed models, or hand in your own design. You select a pre-designed, white kimono, on which you would like to have your artifact applied on the back. After about a week you go back to the store and pick up your finished personalized and very unique kimono.

5.5 Final prototype: 1st iteration
In order to function in a store environment I needed to consider time and set a limit for how long a scan session would take. In the first iteration I set this time to two minutes. Since the scanning in this scenario takes place in a fixed space for a relatively short amount of time, the metaphor is connected to biofeedback. Thus the circumstances invite for a conscious interaction by means of taking control over one’s stress level. A collection of sounds were added to the software to encourage that behavior. These sounds were meant to help the subject in reaching certain levels of mood, and could be chosen through a graphical interface. While measuring, the current level of GSR was visualized. The biofeedback loop came full between system and user.
5.6 Final prototype: 2nd iteration

Changes for this iteration comprised the aspect of excitement and connection to the unknown. The visualization of current GSR in real-time was perceived during test sessions as revealing too much of the underlying processes and decreasing value C: Mystiqueness.

![Scan session GUI: register, calibrate, read, develop. During read, user can listen and choose from relaxing or more up-tempo tunes.](image)

5.7 Wearable emotions

Finally I wanted to put the prototype into the scenario I sketched out earlier. I invited two test persons, Therese and Sylvia, to try the whole experience – from scanning session to the application of their unique patterns onto real objects. My test persons were chosen since I considered their backgrounds would be useful for gaining relevant inputs in my planned interviews. Therese is a very artistic person involved in photography and painting, and Sylvia has a past in fashion design. They both correspond to my target group.

The generated patterns from Therese and Sylvia were printed on large pieces of silk, to become garments possible to use in many ways – scarf, shawl, top, sarong etc. After the garments had been delivered and been with their
co-creators for some time, I held interviews to find out how the products had been received and if a personal connection to them had been established. The interviews were designed to cover my problem statement and four defined key values:

1. How did the personalization of the artifact affect the relation between you and your product, if compared with if you would buy a visually similar product in a regular store? *This question is integrating my problem statement into this real-life scenario.*

2. Did the process feel exciting? *Addressing the Mystiqueness factor.*

3. What is the difference between this kind of relation and e.g. the one between you and something handed down from your grandmother? *Addressing the Uniqueness and Emotiveness factors.*

4. Do you think your generated shawl will get another value for e.g. your grandchildren? Can it be compared to e.g. sewing something on your own? *Addressing the Uniqueness and Emotiveness factors and how they are expected to last over a longer time, and if these values will mean something to other closely related persons.*

5. While wearing your shawl – did you ever think of the fact that its pattern have been generated from you? *Addressing the Emotiveness and Generativeness factors.*

6. Has the model of personalization developed in this project – to generate patterns from the body – fulfilled its function as relation enhancer? Any other type of personalization you’re spontaneously thinking of? *Addressing the core functionality and how the project was put into practice. If the notion that utilizing bodily data can strengthen the overall connection to the final product.*

The outcome from the interviews were very positive and showed that this type of personalization really improves the relationship between a person and her product. It seems like the connection is evoked by alluding to certain hereditarily ways of perceiving emotional connection – parallels were e.g. drawn to when receiving something very special as a kid:

- *The relation is very similar to what I experienced as a kid when I got something very special and dear. The feeling that one would really take care of it, and that it wasn’t a wear-out and throw-away product.*

Also, this speaks by its own:

- *The shawl is the most personal thing I’ve ever got. The combination of generativeness and some kind of experienced haphazardness makes the connection very strong.*
See Appendix I to read both interviews.

The project was exhibited on Fashion Market (www.thefashionmarket.se) in Borås, Sweden, on 24-25th of May 2008. That was the first time going public with the idea, gaining many inputs and suggestions about how to take the next step.

Figure 35 My exhibition stand on Fashion Market, Borås, Sweden, 2008.
6. ANALYSIS

This project has aimed to give an answer and exemplify how personalization of artifacts can improve the relationship between users and products within fashion. I started out by first putting my problem statement into a context where I referred to the personalization trend and the hunt for uniqueness. It was interesting to find out how this phenomena is a behavior inherited in our genes and also part of evolution.

6.1 Individualization and local trend

Personalization has been a trend and still is with the purpose of creating a special relationship between consumer and product. It is not just about meeting someone’s individual practical requirements but also making the product feel personal and something that has got its own soul. When it comes to graphics and interior design there are examples of online services that provide ordering wallpaper to be printed with personal motifs. The next step for this approach can be to contribute with biological data as a way to individualize. I imagine the procedures for these interactions will move from online services to be accessible locally in exclusive design stores, as being a factor in the development of a personal relationship. This helps to achieve that link both literally and metaphorically. It’s also an environmental and climate issue. As Adlén puts it (translated from Swedish):

“Go for the locally produced. Encourage delight and teach the consumers that locally produced food tastes better. Learn from the most skilled chefs, they buy from local suppliers. They become climate smart as a bonus.”

6.2 Analysis of project approach

Since I wanted to create unique and personal artifacts for my target group, who is interested in participating in the design process, I dove into the areas of biometrics and biofeedback – instruments able to retrieve personal, hidden information. The exhibition Give Life II motivated the direction where I was going, and proved that creating artifacts with bio data is a way to go in the hunt for uniqueness. The positive reaction from visitors both when participating in the installation and afterwards when receiving the prints supported the theme of this project.

With a persistent dedication to strengthen the connection between artifact and user, I used my four defined key values as a base for evaluations. From there I could see where improvements were needed. For the final prototype, I developed an algorithm that creates graphical representations of scanned stress levels. The graphical language has an organic feeling, which

is motivated by the tight connection between evolutional design and emotive design, and also since the generative process is using biological information (see chapter 4, Design Framework).

Evaluating the results from the final prototype and how it was received proved that the approach to provide services that invite people into the creative process of producing personal artifacts is welcomed and an area that has a lot of potential. Until today we have seen examples that implement the notion of co-creating personalized graphics even with help from e.g. DNA and fingerprints. However, I consider such ways of addressing the subject might lack some artistic and mystique values which it is spontaneously associated with, but might have a stronger scientific connection since it is sprung from science art made with microscope cameras. I see this more as a documentary about what we look like through the lens of a microscope than enabling artistic collaboration with users. Deciding where to put the limit and to which extent the generative aspect will play in the creation will always be part of the designer’s work, but is much dependent upon what information is used for the generative part.
7. CONCLUSION

The last prototype was tested by going all the way to a finished product. Here, for the first time, I could get a view of the effects from my way of personalizing artifacts, and if it improved the relationship between person and product as I asked in my problem statement in section 2.1. The subsequent interviews revealed that such connection had been attained by alluding certain hereditarily ways of perceiving emotional connection. That resembles what I wrote in section 3.1.1; if a possession holds a history one can relate to, that will enhance one’s relationship to it. So, by evoking that same kind of feeling but in a new context, it is possible to come up with new concepts that establish a strong, personal relationship between artifact and user. This is indeed merging my problem statement with my target group who, to experience an emotional relation to a product, need a deep relation to it that goes beyond just the visuals.

This exciting subject has a great potential for further research, development and implementation, and I am sure we will see many different approaches to this in the near future. I would like to see a development that aims for designing artifacts that create strong emotional bounds to the owner, who should be involved and contribute in the process, adressing my four defined values: Emotiveness, Generativeness, Mystiqueness and Uniqueness.
8. REFERENCES

Books


Academic articles


Schifferstein, H. et.al., 2004, Designing Consumer-Product Attachment, Department of Industrial Design – Delft University of Technology.


Internet

Biometric Watch, 2006, *Famous fingerprints – Art with a message.*
2008-01-29.

2008-01-29.

http://brainpaint.com/
2008-02-02.

Center for Health and Healing, *Biofeedback – History and Philosophy.*
http://www.healthandhealingny.org/complement/bio_history.html
2008-01-11.

Court Technology Laboratory, *An overview of biometrics.*
http://ctl.ncsc.dni.us/biomet%20web/BMOverview.html
2008-02-02.

Court Technology Laboratory, *A brief history of biometrics.*
http://ctl.ncsc.dni.us/biomet%20web/BMHistory.html
2008-02-02.

http://www.counterpunch.org/cox07132006.html
2008-01-05.

Design & Emotion, 2006, *Getting emotional with... Pat Jordan.*
http://www.design-emotion.com/2006/12/04/getting-emotional-with-pat-jordan/
2008-01-16.

Design & Emotion, 2006, *Getting emotional with... Pieter Desmet.*
2008-01-16.

EastWest Institute, *How to make palmistry ink prints.*
http://www.handanalysis.com/inkprints.html
Emotiv Systems, *Emotive EPOC.*
http://www.emotiv.com/2_0/2_2.htm
2008-02-02.

Swansea University, *Forensic fingerprint detection.*
http://www.swan.ac.uk/engineering/Research/MaterialsResearchCentre/ResearchAreas/CorrosionandCoatings/Forensicfingerprint/
2008-01-07.


Gasperi, M., *Galvanic Skin Response Sensor.*
http://www.extremenxt.com/gsr.htm
2007-10-29

Griffiths, J., *Your right life is at your fingertips.*
http://www.handanalysisonline.com/

International World History Project, *Rousseau, Jean-Jacques (1712-78).*
http://history-world.org/rousseau.htm
2008-02-02.

Jones, L., *Fingerprinting Facts.*
http://fingerprints4u.com/fingerprint_facts.html
2007-10-10.

http://visitsteve.com/work/simmer-down-sprinter/
2008-02-02.

Menezes, M., *Functional Portraits.*
http://www.martademenezes.com/
2008-02-02.

Nelkin, D., 1996, *The gene as a cultural icon: visual images of DNA.*
http://www.encyclopedia.com/doc/1G1-18299593.html

Nick, *Writing data to USB memory stick.*
http://www.arduino.cc/playground/Main/UsbMemory
2007-10-29


2008-02-02.

**Images**

All graphics and photographs by Adam Danielsson, except:

Figure 1 & 2: Diagrams from Snyder, 1992.  
See *Academic* above for more details.

Figure 4: From http://www.graffitiprinter.com/  
2008-02-03

Figure 5: From http://news.cnet.com/8301-10784_3-5892455-7.html  
2008-02-03

Figure 6: From http://en.wikipedia.org/wiki/Fingerprint  
2007-10-10

Figure 7: From http://www.nlm.nih.gov/news/press_releases/visibleproof_photos.html  
2008-01-29

Figure 8: From http://dna11.com/  
2007-10-10

Figure 9: From http://www.swan.ac.uk/engineering/Research/MaterialsResearchCentre/ResearchAreas/CorrosionandCoatings/Forensicfingerprint/  
2008-01-07

Figure 10: From http://123child.com/images/fingerprints/  
2008-05-20

Figure 11: From http://www.dominicwilcox.com/footprint.html  
2008-02-27

Figure 12: From http://www.jdwelch.net/writing/manglano.html  
2008-01-29

Figure 13: From http://dna11.com/  
2008-02-27

Figure 14: From http://www.clausmiller.com/GalleryCMIng/09x.html  
2008-06-01
Figure 15: From http://www.emotiv.com/
2008-02-28

Figure 16: From http://brainpaint.com/
2008-02-28

Figure 24 & 25: From http://www.technion.ac.il/~mdcourse/274203/lect3.html
2008-05-11

Figure 28: From http://en.wikipedia.org/wiki/Shrimp
2008-05-11
APPENDIX – INTERVIEWS

Interview with Therese, 26

1. How did the personalization of the artifact affect the relation between you and your product, if compared with if you would buy a visually similar product in a regular store?

– The relation is very similar to what I experienced as a kid when I got something very special and dear. The feeling that one would really take care of it, and that it wasn’t a wear-out and throw-away product. “I won’t get a new bike tomorrow if I destroy or loose this one.” There are actually few things that one has a personal relation to. It’s easy to get reminded of the consumer society we’re living in just by looking into people’s homes which look more or less the same. However, everything isn’t interchangeable. A piece of jewelry that was handed down from my grandmother, has an invaluable sentimental value to me. Even if I might find a similar one (which carries its own history and energy since it used to belong to someone else) at the pawnbrokers, that would never be the same. Relations to new things, which seldom carries a history one can relate to, are rarely created.

– The shawl is the most personal thing I’ve ever got. The combination of generativeness and some kind of experienced haphazardness makes the connection very strong. There wouldn’t be the same relation if I would ask an illustrator to draw me a painting. Why not make a tattoo from these kind of patterns...?

2. Did the process feel exciting?

– Yes, absolutely! I felt like a kid on Christmas Eve... The idea is magic and the process is exciting.

3. What is the difference between this kind of relation and e.g. the one between you and something handed down from your grandmother?

– It’s another type of relation and personal connection. A ring that my grandmother got from my grandfather as a proof of their love, has of course a great sentimental value to me. So, this shawl will probably allude that same kind of feeling to my grandkids. “My grandmother’s body generated this, which I am now wearing.”
4. Do you think your generated shawl will get another value for e.g. your grandchildren? Can it be compared to e.g. sewing something on your own?
– Difficult to compare since it’s a new product. If to be compared with something, it should be with something that has meant much to that certain person. My grandmother had a lot of clothes, and there are many left behind, unused in good quality. But I don’t feel much connection to those. It’s different with e.g. her purse, which carries traces from how it has been used. Visual, figurative traces. So, it would feel oddly close to wear a shawl with someone’s “feeling” – closer than a handwritten letter? Yes, probably it would. What one finds interesting and likes about a person – qualities, a whole that is hard to explain – are also things one does not really know. What just is and comes from within. That’s impossible to draw with a ruled hand. The artifact acts as a kind of echo and feels very real. When I miss grandmother I miss her presence, things one cannot touch. I’m better at baking while in her old cottage...

5. While wearing your shawl – did you ever think of the fact that its pattern have been generated from you?
– Yes, I did! I felt very proud... It felt personal in a nice way. Nice and easy to wear – felt as “me”.

6. Has the model of personalization developed in this project – to generate patterns from the body – fulfilled its function as relation enhancer? Any other type of personalization you’re spontaneously thinking of?
– Yes, what I like about it is that it doesn’t have a perfect, readable meaning, like “I have a tattoo with a Chinese sign which says strong”.

– To always make use of what one’s got. For example, you always look good if wearing your iris color, or maybe its complementary color.

– To trust someone to the extent that I let that person draw me a tattoo. I once asked an artist in London, but unfortunately he gave me a definite no... he didn’t dare. But it would be honorable to have a tattoo uniquely drawn to me. I mean, something that really reflects who I am as a person.
Interview with Sylvia, 52

1. **How did the personalization of the artifact affect the relation between you and your product, if compared with if you would buy a visually similar product in a regular store?**

   – It’s a big difference – it feels like this is my own and no one else’s. It feels like I have been present through the whole process – from the initial scanning session and observing the artifact develop, to when it was cut out and transformed into a garment.

2. **Did the process feel exciting?**

   – Yes, very exciting! It was fascinating to see the pattern develop, and I was very curious about how it would come out when applied to textiles. To generate a pattern, see it get developed, and then get a product with that pattern applied.

3. **What is the difference between this kind of relation and e.g. the one between you and something handed down from your grandmother?**

   – Things that I have inherited are unique solely because they used to belong to my relatives. There’s a need to keep them, even if I might not use them, since they belong to my memories. The relation I have to the shawl is more about me and my own person, and more connected to the contemporary.

4. **Do you think your generated shawl will get another value for e.g. your grandchildren? Can it be compared to e.g. sewing something on your own?**

   – To make things unique and personal in the past, people could e.g. use color extracts from certain plants. My husband has a woolen rug inherited from his grandmother. The wool was taken from the farm’s sheep and then worked by hand. There’s a strong connection to history and heritage. So yes, I think this shawl will have such similar value to my grandkids.

5. **While wearing your shawl – did you ever think of the fact that its pattern have been generated from you?**

   – Yes, I also thought about that it is a pattern that no one else has. I had a feeling that I wanted to tell everyone I met about it...!
6. Has the model of personalization developed in this project – to generate patterns from the body – fulfilled its function as relation enhancer? Any other type of personalization you’re spontaneously thinking of?

– Yes, it feels very personal when the product is generated from me. That I have used my own body – I consider myself being tightly connected to the end product.