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CHALLENGES IN SUSTAINABLE TOY DESIGN

Final Thesis 2013

ABSTRACT

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Challenges in Sustainable Toy Design

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The subject of this final thesis was to conduct research on sustainable toys for children and to make such a toy based on the findings. The idea was to use sustainable, ecological, and chemical-free material to create a fresh looking and long-lasting toy that also appeals to parents' aesthetics. The aim was to create a toy for entrepreneurial purpose that could be manufactured on a small scale with little equipment and simplified manufacturing processes for low costs.

The goal of the research was to determine what makes a toy sustainable, to find the possible ecological materials suitable for the design task, and to determine the niche in the ecological toys market in Finland. The following research was to further study the chosen material, reindeer leather, and the possibilities and qualities it offers.

The research was conducted by studying Internet sources and literary sources concerning ecological materials, ecological design, leather manufacturing and leatherwork techniques.

SYMBOLS, ABBREVIATIONS AND TERMS

Beeswaxed (linen) thread

Used most often in leather works as it is strong and takes wear; beeswax strengthens thread, waterproofs and makes it easier to slip through leather when sewing (Maquire 2012, 16).

Die

Die is a shaped metal blade, which is used to cut material with a press. A die for leather cutting looks similar to the one made for cookie cutting, with the exception of having a supporting metal cross to make it stronger.

Edge beveller

Made to trim and neaten the edges of leather, for instance, making it easier for sewing (Maquire 2012, 18).

Etching pen

A pen that has a sharp metal tip, used for instance to make marks on metal and wood.

Hand sewing leather needle

Blunt-ended needle ideal for leather (Maquire 2012, 18).

Hole puncher

Made for punching holes in leather, comes in single ones that are used with hammer or as a rotatory punch with many different side punches that does not require a hammer (Maquire 2012, 18).

Pyrographer

Burning pen for drawing on leather by burning marks on the surface.

Rivets

Rivets are designed to join two or more materials together and are made from metal (Maquire 2012, 16).

Sisna

Sisna stands for vegetable tanned reindeer leather, the word originating from Finland's Lapland (Saamelaisalueen koulutuskeskus 2012, 32).

Sustainable design

Creating a balance with three interdependent elements of economical profit, culture and ecosystems in the design throughout (Fuad-Luke 2009, 22-23).

Tannin

Substance that is naturally obtained for instance from tree bark, and is used for making a preserving solution for vegetable tanning (Taylor 2009, 36).

Tanning

Process of preserving leather (Taylor 2009, 35).

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1 INTRODUCTION

Sustainable design, or eco-design, has been ever increasingly discussed for the past few years. Many companies have begun to produce sustainable products, and others are increasingly starting to take issues related to sustainability more into consideration in their production processes. Consumers have become more aware of the problems of consumption and Climate change and have started to demand products that are more ecological and environmentally friendly.

Personal and professional interest in sustainability and ecological issues led to choose the subject for this final thesis. Becoming a mother and being conscious of the problems existing with toxic chemicals in our environment, especially in the air of children's rooms, made the choice easy for wanting to design a non-toxic toy. Professionally, the interest of creating sustainable design has been there throughout the studies, ever since the beginning.

The goal of the research in this final thesis was to find out defining factors and possibilities for a sustainable toy as well as materials and methods to match them. Furthermore, an aim was to find an existing niche in the ecological toy market in Finland and to create a suitable product from the chosen material to fill that void.

This thesis presents the research, result analysis, and the design process resulting from the research findings from Internet, literary sources and qualitative interviews as well as personal discoveries during the designing process.

1.1 Context and frame of reference

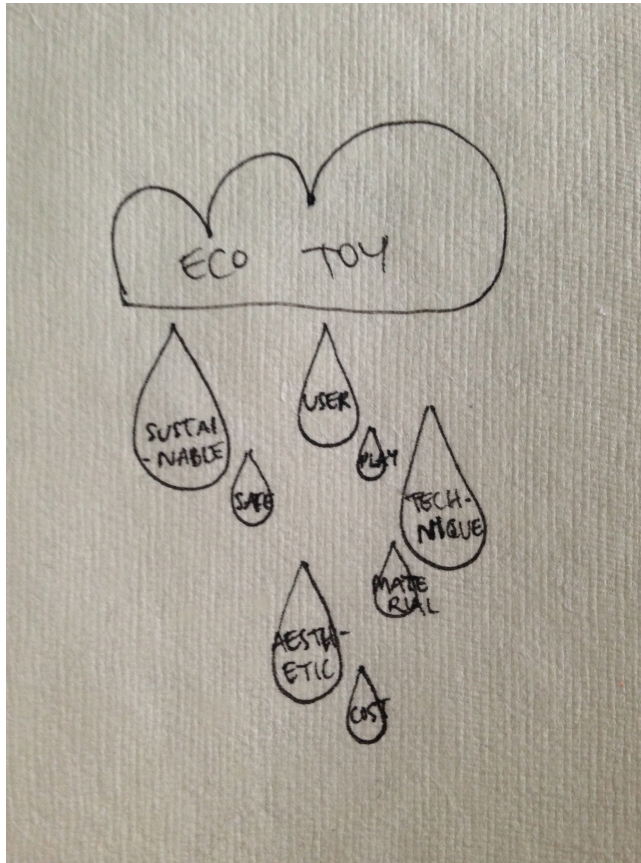


Figure 1. Frame of reference

Frame of reference in Figure 1 shows the key elements of this thesis work. Ecological toy in the cloud and four large and small waterdrops representing the four different element pairs. Techniques and materials are intertwined and a very essential part of a productional thesis. Aesthetics and costs go together, as many times the outlook of the product and changes to it have an immediate effect on the cost of production. Thus both elements have to be considered together. Safety and sustainability are a pair, safety represents being both safe for children and free of harmful chemicals, as a part of sustainable production. Lastly, user and play, there is always a user for a product and in this work that is children, and the purpose of the product is to play with it, hence the combination.

1.2 Research methods

The used research methods were qualitative interviews, studying literary source materials and Internet sources. The interviews were conducted in person or through email

due to geographical distance. Firstly, the research was aimed to discover all the suitable materials for the meant purpose and to find a niche in the ecological toy market in Finland. When the material was defined and the exact type of toy decided, the aim of the research was to go deeper in the qualities, possibilities, and restrictions of the chosen material.

1.3 Research questions

The research questions are which material possibilities exist in making an ecological soft toy, what is the current niche in the ecological toy market in Finland, and what exactly makes design sustainable and ecological. The second step when defining research questions focused on how to keep production costs low, and yet create an aesthetically desirable high-quality item.

2 RESEARCH DISCOVERIES

2.1 Ecological toys in Finland

The ecological toy market in Finland is currently quite small compared to the mainstream mass-market products but it is constantly growing along with the parents' awareness and interest in chemical-free, safe toys. Ecological toys are available mostly in web stores. In the research of the existing products on the market, one thing became evident; the market is flooded with soft toys that would fall in the same category with teddy bears and other plush toy creatures with the purpose of being a sleep buddy or a mascot (Figure 2 & 3). The ecological toys in the market are very trendy and quirky, appealing to young, style-conscious mothers. The Bundi soft owl, for instance, by eco-brand Mifuko that have their products designed in Finland, but made ethically in Africa, the owl is made in Nairobi. The owl is knitted from bio-friendly, dyed organic cotton. Another example is the sewn soft toy Mister Pike that is both designed and made in Finland by Punainen Norsu. Punainen Norsu mostly makes clothes from recycled fabrics, but has a few patterns of their own as well.



Figure 2. Bundi soft owl by Mifuko, 35 euros



Figure 3. Mister Pike by Punainen Norsu, 24 euros

The other well represented categories were chewable toys for babies and toys made out of wood, like building blocks, cars and puzzles (Figure 4 & 5). The most popular materials in the ecological toys are cotton and wood. Both of the mentioned are well-known everyday materials with existing resource-chains for easy accessibility. They are traditionally used as natural materials and easily considered sustainable by the customer. Both materials are biodegradable, renewable, cost effective and recyclable. All the mentioned qualities explain the popularity of the materials. Below is a picture of the prize-winning game puzzle named ShapeMaker, which is directed more at older children due to its difficulty (Figure 4). It is made of eco-friendly rubber tree and hand-painted with non-toxic paint. Figure 5 shows the classic and recent must-have

for trendy babies: Sophie the Giraffe. The chewable squeaky toy is made from natural plant-based latex and hand painted with food paint.



Figure 4. ShapeMaker by Miller Goodman, 52 euros



Figure 5. Sophie the Giraffe by Vulli, 24 euros

What was found missing in the ecological toys selection was proper animal figurines for playing; there are animal character plush toys and some wooden animal puzzles, and then in the other end of the spectrum are expensive design collectable wooden animal figurines that are more directed at adults rather than children. In Figures 6 and 7 below is a chunky wooden puzzle with animals that can also be put standing and Kay Bojesen's rabbit from his collection of wooden figurines that are more of collectables for adults due to the pricing.



Figure 6. Wooden chunky zoo puzzle by Janod, 19 pounds



Figure 7. Wooden bunny by Kay Bojesen/Rosendahl, 95 euros

Existing leather toys are very few, with none of them being mass-produced but most of them being experimental pieces or limited-edition collectables. Below is an example from Adrian Rovero, the collection of animals were made as a design project for Passionswege at Vienna Design Week 2009 in collaboration with leather manufacturer Thomas Posenanski (Figure 8). The leather is cut from production leftover pieces and assembled with rubber fastenings. Skinni is not in production.



Figure 8. Skinni by Adrian Rovero

2.2 Toys and play

Nowadays play is considered something only for children, which is a rather new viewpoint. Even at the beginning of 1600s, games were still almost the same for adults and children. Work and play were interconnected, and as children were considered almost equals to adults in good and bad, they also had to work and play alongside adults. The two worlds were much closer and more connected than nowadays, unfortunate for the children having to work, but good for togetherness. This still did not mean children were able to play freely on their own terms. In history there have only been a few brief periods enabling such play, as usually the adults have been controlling games according to appropriateness of current manners and educational models of the time. The concept of children and childhood is new, starting from 1800s bourgeois children. Even in 1950s children had to take part to work in the countryside Finland and that is still a realm in poorer countries in our times. In the 1800s, industrialization separated adults from play for good. Work has taken over the adult life and play is no longer a part of it as it used to be. As the existence of play is ever decreasing from adult life, the concept of *homo ludens* - playing human, has moved well into past. (Franck 1990, 3, 53-55, 61.)

In play, what one does or says cannot be taken literally; it is not what it seems. In play the player is “being as if you are”, pretending something else. Toys are means of play

and to stimulate the imagination. The concept and skill of play is passed to a child already as small babies from the parents, thus the adult is their first playmate. Usually it is such a play as the parent saying to their baby “oh, you smell so nice, I want to eat you”, but with body language impressing that it is not real, but just for play. The level of consciousness in play has proven to be healthy and energizing for both children and adults, it gives zest for life. In today’s world the attitude towards playing is very positive but a paradox; it is considered important for development but it should also be educational. This is also reflected in toys; there are three reasons for an adult giving a toy to their child: for giving delight, obtaining a moment of peace while the child plays alone with it, and for a child to learn something from the toy. An example of this is a child playing with building blocks for the pure fun of it, and the adult seeing it as an examination of color and proportions. (Franck 1999, 3, 7, 10-11, 21-22, 45.)

Playing with animal figurines goes far back into the time before industrially made toys existed. Traditionally children used to make their own toys out of natural materials like twigs and tree cones, as they were available. The toys were very often animal figurines. For instance, in Finnish tradition one was called *käpylehmä*, a cow figurine made from a tree cone with four twigs for legs. (Franck 1990, 61.) The modern-day response to those animal figurines is a range of all kinds of more or less exotic animals made out of plastic. In this thesis, an alternative to that was searched for.

2.3 Material possibilities

With the intension of creating a toy from a soft material for children, the materials in question would be textiles and similar materials. Textile industry is one of the most polluting industry when it comes to water resources. The World Bank has estimated that nearly 20% of industrial water pollution to come from textile treatment and dyeing. (Blacksmith Institute 2013.)

Cotton is not usually considered as a very sustainable textile material as it uses plenty of water and pesticides. For one kilogram of cotton up to 40 000 liters of water is needed. In production of cotton, there are more chemicals used than with any other crop and the use of chemicals not only pollutes air and water but can also be harmful for the end user due to chemical residues. However, organic cotton is environmentally more friendly as the use of chemicals and pesticides is forbidden (Yalo, 2013). Growing cotton still needs plenty of water and as it is often grown in the areas where there

is a lack of water, thus even organic cotton cannot be considered the most sustainable textile material. For this design project, cotton as a material is not the most suitable one either, not least because there are so many ecological children's toys made using organic cotton. Cotton tends to be very thin and fluid by its qualities, whereas for this project the search was for a firmer material. Previously considered other lightweight ecological fabrics, like bamboo, are not more considered in this chapter for the same reason.

Hemp fiber has a similar look and texture to linen but it has much better productivity rate. Hemp fiber has been used to make fabric for thousands of years, but its popularity has been suffering from other hemp varieties that have narcotic influences. The use as a clothing material has become more popular with the ecological trend, but the image still is very much connected with hippies and not considered that fashionable. Hemp has many good qualities; it is very strong, grows fast with little need for pesticides, crop returns are high, and it does not drain the earth from nutrients. (Fuad-Luke 2009, 291.) Hemp can be blended with other materials to make it more attractive to buyers, for example the ecological clothing brand Kuyichi has made jeans with cotton-hemp blend. Hemp tends to be a stronger material than cotton and would also tolerate wear and tear of a toy better than cotton.

Wool is rather ecological as a material, if the environment is not being harmed by the lambs and if there are no chemicals used against parasites. Wool felt is a material made from lamb wool with a few possible methods that stick the wool fibers together. Wool has excellent qualities, one of the best being the self-cleansing feature, thus it does not need to be washed as often, it is also water-repelling. (Koskenpään Huopatehdas 2013.) These qualities would be great in a toy especially for young children, on the other hand one problem might be that if some fibers come loose to child's mouth while chewing the wool felt toy. Wool felt has many of the qualities that were searched for in the material for this project, such as being tough and rigid as a material, maybe even too much.

Leather is not a textile as it is made from animal skin, though it has similar qualities as textiles have, most importantly it can be cut and sewn. To become leather, the animal skin has to be treated by tanning. Tanning leather includes physical and chemical procedures to make it usable, to stop decomposing. The usual process of making leather

is not ecologically stable; there are chemicals, metals and minerals used in the process that are polluting to waters. There is a more ecological way of doing the tanning, called vegetable tanning, in which plants are used to make the tanning solution. Even though the solution has been made by using plants, like tree bark, it is still polluting as it is mixed with water, thus the substance is in the wrong place. There are several ways to minimize the contamination during tanning: the tanning solution should be re-used, the water usage should be minimized, the animal skin should be stored in cold to minimize the use of salt for preservation, the animal skin has to be cleaned mechanically from meat, fat and hair remains, and lastly, water has to be efficiently purified after the process. (Lladó i Riba & Pascual i Miró 2008, 25, 159.)

In vegetable tanning harsh chemicals are not used and the handwork makes the process more expensive. Vegetable tanned leather is not as easily available. Questions arise of the necessity of using leather, it is a side product of the meat eating society and although the vegetable tanning process is not yet completely ideal, leather takes heavy usage and is very long-lasting once made. It is also biodegradable in the end of the lifecycle if made without chemicals. After consideration, vegetable tanned reindeer leather was chosen as the material for this thesis and it will be more detailed handled in the following chapters with the reasons why it was chosen.

2.4 Interview

The interview was done through email and the aim was to find out more about vegetable tanned reindeer leather and its availability. The contact was made with a company that sells vegetable tanned reindeer leather, Kemin Nahkatarvike Oy, from where Mr. Jouko Eskelinen answered. It turned out that Eskelinen is also the man who has written the book *Harrastajanahkurin käsikirja 1*, which describes the techniques on how to tan leather in a natural, old-fashioned way, as a hobby. Eskelinen explained how their leathers are made industrially and even though they use vegetable tanning in the reindeer leather manufacturing process, there are still other chemicals and synthetic agents used in the other parts of the process from which there might be remains of in the finished product. One of the questions was about whether a child was to taste the leather toy would that be safe. He suggested that to be sure of the safety of the leather, Evira, Finnish food safety authority, should examine it, adding that this would be rather an expensive solution. Eskelinen told that the chemicals and agents they use include

washing liquid, chalk, natriumsulfide, ammonium chloride, salt, sulfuric acid, synthetic pre-tan agent and synthetic grease. (Eskelinen 2012.)

Worries raised about the list of chemicals used in the manufacturing process and further research was needed to find out whether there was a more natural reindeer leather available for purchasing. Eskelinen (2012) was trying to convince that the same chemicals are being used in the natural way of leather tanning as well; they merely were considered natural where as when the same agents were purified and industrially produced, they became chemicals in people's minds.

In search of finding out more about the natural, old fashioned method of vegetable tanning leather, a project carried out in years 2006-2007 called "Sisnaa poronnahkaa" was found, which was administered by The Sámi Education Institute. One of the goals of the project was to encourage local craft makers to start producing vegetable tanned reindeer leather by developing the methods of it into possible small-scale mass production. In the context of this thesis, such leather was not found for purchase.

2.5 Toy safety

The documentary, Submission (2010) by Stefan Jarl, states that the chemical burden we carry has exploded since the World War II. Jarl gets his blood checked and the results show that he has hundreds of industrial chemicals, even the long ago forbidden ones, in his body. Many chemicals that are used in, for example, plastics are found to cause cancer and to decrease reproductive capacity. In the documentary there was a professor stating that the amounts of certain cancers have increased and that it is a fact that the male reproductive capacity is lowered. The most worrying was not the chemicals alone, but the chemical cocktail of hundreds of different chemicals and their combined effect is a mystery and humans are the guinea pigs. Another professor stated that the most chemicals are measured in the children's rooms, as they have the most items with plastic, especially the softened types of plastic. This is very unfortunate also because the younger the person, the more sensitive one is to chemicals, and the more important to keep safe from them. (Jarl 2010.)

In the EU, Toys Safety Directives EN71 1-11 and EN 62115 determines the regulations concerning toy safety. In Finland the Directives requirements are made valid with the Toys Act. This law concerns requirements of constructional and chemical

safety of toys and the requirements for producers, importers and resellers. If the toy can be considered to be used by under 3 year olds, there are additional restrictions. (Turvallisuus- ja kemikaalivirasto 2013.)

Nearly all soft material toys and stuffed toys fall into the category of being toys. Soft toys are cuddly which responds to a young child's natural instincts, they can also serve as companions and can be used in simple playing, they are lightweight, small, can be easily lifted, they are similar to themselves; baby, small animals. All the mentioned represented, the toy should be made to be suitable for under 3 year olds. (European Commission 2009, 2-3, 8.)

The chemical safety requirements have recently got stricter, now regulating the limit values and prohibition of nineteen substances instead of previous eight heavy metals. (Yrittäjäsanommat 2013.) Worries raise about the toys that have been made before the stricter regulations, as they are still in use, and are the new regulations yet enough to ensure safety.

According to Turvallisuus- ja kemikaalivirasto (2013), the producer of a product is considered responsible to ensure the safety of the toy and to conduct the needed tests before letting the product out on market. The producer also has to document matters concerning the toys designing and production in a Technical file and make a Declaration of Conformity. When the safety is ensured the producer should complete the product with CE mark either on the product or the package. The CE mark is the producer's claim of the safety and authorities do not check it systematically. In Finland the authorities make spot checks and checks on notifications, for example made by consumers. Hannele Lampela (2012) tells in a news article, that last year there were on estimation over 7 million products in the Christmas sales alone. Taking that into account, it would be impossible to check all the products. The mentioned news article also tells that it is more of a rule than an exception that there are safety problems and that one can not trust the CE mark on a product. Consumer awareness is required when purchasing a toy, and there would be room for improvement in the system.

Within the context of this thesis, there is no funding to test the products safety, so the decisions had to be made relying on assumptions and common sense. The chosen material is questionable; one of the toy safety regulations for the material is to be hygienic and possible to wash or cleanse otherwise. Leather cannot be washed; questions rise

whether or not it is good enough that it can be wiped clean with a damp cloth. This means possibly that it would have to be forbidden for under 3 year old children. It also restricts the stuffing material options. Most likely the stuffing should be the most common 100 per cent soft polyester stuffing, where as the idea was to use natural stuffing like dried peas, which might create a choking hazard. As from the material point of view the product already could not be for under 3 year olds, perhaps for children over 3 years of age it is possible to use dried peas as the stuffing when it comes to choking hazard part. However, when the washing or hygiene comes to question, the dried peas are out of question again.

One very important point in connection to sustainability and toy safety is that the toy has to be chemical free. Questions arise whether it is possible anymore in this world full of chemical exhaust to find such material that naturally does not contain any chemicals, as they are everywhere. After pondering it was found that perhaps it is a fact of not *adding* chemicals in the process, which is the real point. In the old fashioned way of tanning leather it is possible to make it without artificial chemicals. The question is to find a person who would or could supply naturally made vegetable-tanned reindeer leather for the products.

2.6 Consumerism

Today's world is largely based on a consumer culture. Consuming is more and more becoming over-consumption, nothing is good enough and consumers are left wanting the next, the new and the better one. As it is not realistic to assume that the consuming way of modern life would end in near future, it can be made more sustainable. (Proctor 2009.)

The consumerism can be made sustainable with several ways, one being a radical idea: there is no waste. The cradle-to-cradle ideology described by McDonough and Braungart (2002, 104) suggests that waste is actually food; according to it there are two types of cycles, biological cycle and technical cycles. Biological cycles consist of biodegrading materials like food, and in technical cycles the waste becomes "food" for industry. Simplified, to enable this system, the toy should be able to easily be recycled, to become *food* for the system again. It is essential not to mix the two cycles, or to keep them easily separable. As leather is biodegradable, so should the other materials be or disassembly ought to be simple.

Another way of making consuming sustainable is to create high quality, long lasting products that have added value, making them worth saving as a keepsake. An example of this could be a design chair from the 1960's, the design has been so timeless that it holds monetary value even today and is desirable by not only collectors but also ordinary people looking for special pieces for their homes. Key is to create a design that can survive the toll of time, aesthetically and literally. To decrease the over-consumption it is valuable to create items with stories behind them and with aesthetics that last. If the item has history and thus added value, it is respected and cared for. The idea behind a toy for this project is to create something that will be passed to future generations, as it will last to future generations, as will those plastic toys of today whether they are in the houses or in the landfills.

2.7 Importance of sustainability

This planet is a closed system; what is here, has been here and will continue being here. Throwing used items to landfills and pretending they just go away by hiding them is just fooling ourselves, since there is no such thing as "away" in this planet. With over-consumption, consumerism and throwaway-ism we are simply digging a grave, the resources are limited and consumption is restrained, whether we want to understand and accept it or not. (McDonough & Braungart 2002, 27, 103.)

To make matters worse, in the technical world, items are made to break before their time, as so-called planned obsolescence. The company decides the age after which the product will break, thus enabling the purchase of the new product. This can be ensured for example by manufacturing products of poor quality or a built-in counter. In a world of material limits this shortsightedness is unacceptable. (Dannoritzer 2010.)

All this said, there is simply no way to overlook the inevitable: production has to become sustainable, the sooner it happens, the more painless it will be. In this thesis and also personally in my future career, for me it is essential not to bring any more unsustainable objects in this world, otherwise it is better not to make any at all if it cannot be made sustainably. What comes to toys, it cannot be more emphasized how important it is that children can play with safe toys. As there has recently been made stricter regulations for toy safety, it would be great to see increasing use of natural materials and sustainability taken into account in toy design as well.

2.8 Criteria

There are several different ways to determine the qualities of a sustainable product. According to one there are five different elements: cyclic, solar, safe, efficient and socially responsible. “Cyclic” means to create a loop where used materials are recycled thus becoming new material and “solar” simply refers to the usage of renewable energy in the production process. The element of “safety” is about what the product releases to air, water and land during its whole life cycle, for example chemicals and dyes. The aim is to reduce or eradicate negative releases, not only for the nature but also for our own health. “Efficiency” is self-evident in the context of sustainability: resources are limited and therefore materials should be efficiently used. The final element, socially responsible, is a question of fair rules of work and basic human rights. Matters as allowing trade unions, providing decent conditions and pay are necessities in being socially responsible. (Brower, Mallory & Ohlman 2005, 9-10.)

In addition to the elements of the previous paragraph, another source suggest to also justify the need of the product in the world of plenty and to ensure an optimum product life (Benjamin, Edirisinghe & Zwetsloot 1994, 100). The time of a product being used should correspond with how long it will actually be around, for example a toothbrush is recommended to be used for only 3 months, but if it is made of plastic the question of how long is the actual life after the use arises. Another way of setting requirements is listing the ecological features of the product: biodegrading, fair-trade, locally sourced, low energy, low waste, no toxins, recyclable, recycled and responsible resources (Proctor 2009).

The guidelines above determining what makes product ecological were all taken into account in the design process. In this specific design case the sustainability criteria were biodegrading, locally sourced and manufactured, low energy, low waste, none or reduced toxins and responsible resources. Additionally, the justification of the product need is that children need to play in effort to learn just for the fun of it, and they need safe toys as a counterpart for the toxic ones and natural materials as counterpart for the synthetic, plastic, one. The toy should be strong to last the wear and tear of heavy use and the product life continues when the toy is passed on to the next user.

3 DESIGN PROCESS

The design process followed the guidelines of one of the basic design methods, the same method that we have been taught during our studies. The method is a concept creation model, shortly described in the following steps: brief, brainstorming ideas, creating sketches, alternative concepts, developing concept, finalized concept. (Kettunen 2000, 61.)

The project implementation method is from a book by Anttila (2001, 114) and it was the following: ideation, problematization, planning, execution, presenting result. Ideation in this project was to define the subject and to draw the limits to it, although that had to be repeated few times throughout the project as the subject kept expanding too wide. The problematization includes specifying the problems or in this case research subject area, which also had to be redefined a few times during the project.

3.1 Design brief

There was no outside client for this final thesis as it was aiming to create a product for my own production. The objectives of the design task were to be suitable for small-scale production, to minimize the need for expensive production equipment and to simplify the manufacturing process. All previously mentioned were to reach low production costs in the aim to provide the best possibilities for creation of the actual company and start of production.

The basis of the design task was to create a safe, sustainable and aesthetically pleasing functional toy for children. The chosen material was to be free of harmful chemicals, long lasting, natural and sustainable. In the functionality of the toy the most important features were the softness, the suitable size for child's hand, the durability, the safety issues and the function as an item for play. The criteria concerning sustainability features are determined above in chapters 2.6-2.8. The goal was to create fresh-looking, charming set of toys and not having to adjust on any of the wished features, those being the ones of the ecological or aesthetical kind.

3.2 Vegetable-tanned reindeer leather

The chosen material for the design was vegetable-tanned reindeer leather, which is called *sisna* in Finland's Lapland. (Saamelaisalueen koulutuskeskus 2012, 32.) Making *sisna* has long traditions among the indigenous Sami people of Lapland as they are known for their reindeer herding. The reindeer herding is semi-domesticated, meaning that the reindeers live half-wildly roaming free on pastures and are gathered together for calf marking and herd separation. (Suomen käsityön museo 2013.)

3.2.1 Reasoning

Choosing exactly vegetable tanned reindeer leather as the material was based on several different supporting issues that all are somehow connected with each other. Firstly, reindeer leather is a local or domestic product and supporting the livelihood of indigenous Sami people is both important from culture sustaining point of view and also adds value to the product. Using leather can be considered ethically questionable especially in ecological field of products, yet reindeer live half wild in their natural habitats and reindeer herding is in accordance with the species natural way of living. According to Maa- ja metsätalousministeriö (2013), reindeer are herded for their meat and leather is a side product.

Another issue supporting the choice of material is the current "homing" trend, which is tightly connected to the previous mentioned issue as well. Starting with the economical crisis, homing is a continuance to the worldwide "cocooning" trend, which is a search for safety through one's own home as a counterbalance to the overwhelming technological progress. Homing differs from cocooning by being collective, for example to gather together to do things like cooking or making handicrafts. Homing is related to collectiveness, being family-centered and sustainable development and is a countertrend to individualism. It values things that have been considered old-fashioned and traditional, like handicrafts, cooking and cultivation. Being in connection with other current trends of "slow life" and ecological awareness, it connects very well with the subject of this thesis. Along with the homing trend consumers value handicrafts and well made products that are ecological and long lasting. (Jokinen 2010.)

Suitable for the homing trend, my personal history is related to leather. My mother's father used to produce and sell leather products like jackets, gloves and accessories and along with him the whole family was involved. My hometown, Kokkola, is known from leather products and even today has several manufacturers or leather producers in both refining leather and making finished produce. With this work I am in my own way continuing the tradition and using the existing skills that run in the family. Sustainability is the refreshing aspect to the tradition, as well as creating a new fresh outlook to the material with the design viewpoint. Reindeer leather as such has been used for decades for traditional Sami handicrafts and in this project it is to be used in a new context. Combination with tradition and modern time is essential for the successful end-result in this project.

3.2.2 Leather history and qualities

Leather has been used for thousands of years and it was most probably the earliest clothing material used. In early times it was as expensive as precious metals. Later on it was used as money, first as cut pieces and then gradually becoming to coin shape, even with value printed on it. The hardwearing quality was discovered early on as it was used as armory and it was also used as war tents protecting from wind and rain, which tells about the craftsmen's skills of tanning leather to make it rainproof. In the Middle Ages it was the *plastic* of the time, it was used so much in everything ranging from water jugs to horse carriage covers, and leather making was protected by guilds to ensure the good quality. (Maquire 2012, 8-10.)

The material qualities looked in this project was something easy to form, so that it could be produced without expensive machinery but not too fluid, so that it would stay in shape and take heavy use. The material should also be out of ordinary in the chosen context, toys. Leather ticked all the boxes and as it was vegetable-tanned that of reindeers, it was sustainable as well, as has been gone through in previous chapters. The problems came in while discovering about toy safety standards. As pondered in chapter 2.5 Toy safety, the hygiene and cleansing properties of leather were problematic. By common sense I would not question the hygiene of leather; it is washed and cleansed and treated during the tanning process. That ought to make it as hygienic as any other natural material, like wood, which is commonly used in toys. The hygiene in use is trickier, but if it is treated with beeswax it will be drool repelling and tolerate

wiping with damp cloth or a microfiber cloth for cleansing. As there are seams and stuffing in the toy, it would not be recommended to be used by a burping baby. Beeswax is another question, as honey is not allowed for under 1 year olds because of risk of botulism, does that apply with beeswax also? According to Mari Nevas (2006) the wax also has a possibility of containing *C. botulinum*. Interestingly enough, beeswax is used even in babies cosmetic products, for example in Weleda Baby Calendula Face Cream. (Weleda 2013.)

3.3 Concept

Besides of all the technical details of the toy about sustainability, safety and so forth, the idea of the toy for this thesis work was to bring families back together. Taking into account the history of playing, and how grown-ups rarely play anymore as contrast to how it was before the work life became such a dominating part of life, became an idea to go back in time taking the positive part and bringing it to the present. By making the toy appealing to grown-ups sense of aesthetics it would excite them to not only buy it for their child but to want to play with it too. This would encourage parents to spend more time playing with their kids, not only for the kids happiness but also because it is fun, energizing, and gives quality to life. Being surrounded by beautiful objects inspires people throughout all aspects in life, even the dreaded work. As the beauty is not enough, this toy also has a story, from the *tunturi* mountains in Lapland with reindeer roaming in free pastures with Sami people to a small workshop where they are each handmade with love by a local designer. The manufacturing process guarantees each one to look slightly different with unique appearances. These are not just toys but appealing objects that do not have to be hidden in boxes after play, something one would like to have on display or at least not having to be bothered whilst they are left on the floor after playing. They also resemble from the old-fashioned toys that grown-ups might remember from their own childhood, raising nostalgia. This toy is not sold with glitter and dazzling colors and by claiming it will make your child smarter, make them learn important things by sitting alone and playing, but they are for what really play is all about; life. This toy is not made determined how or what to play with it, it is for the player to decide upon and only their imagination is the limit.

To emphasize and excite the creativity, there would be a supporting webpage for the toy, where one could for example print free environment illustrations for the toys. The

toy purchaser could print them out and by gluing and cutting to create three-dimensional environments for the animal toys surroundings. There could also be for example patterns to make small accessories for the toys, like a tutu for the bear and a bow for the owl and such silly ideas. The different ideas could help making the toy suitable for different age groups, like small children and elderly. Craft projects could be yet again something connecting the families and giving inspiration. By creating its own unique stories for the toy it would also deepen connection to it, making it something to keep and treasure.

3.4 Tools and techniques

In effort to gain more knowledge about the processing of the chosen material, designer-stylist department of KyAMK was contacted for a possibility of consulting a lecturer that would have experience on leather sewing and handling. Being directed to Seija Vainikka, I was able to get lot of valuable advises during the consultation. After receiving the piece of leather I ordered from Kemin Nahkatarvike Oy, it came as a surprise that how thick the material really was. Although being thick it had been softened mechanically so it was not stiff. Had I got a possibility to see the materials before purchasing it, I might have considered buying the un-softened variety incase it was stiff enough for being able to use the material differently with processing it with the other possible cutting and folding techniques. From Vainikka I learned that the leather was too thick to be sewn by machine, at least by the ones owned by school. She suggested using a hand sewing technique for the model pieces and we were discussing a few possible ones. For the future manufacturing it might be necessary to buy a fur sewing machine, enabling the most invisible seams and according to Vainikka it might be the best suited for my purpose. To ease the hand sewing and machine sewing as well, the heavy thickness of the chosen leather ought to be pared away for the seams with a flat angled knife. (Vainikka, 2012.)

After nearly one and half year of raising up a test user and coming back to this stage, the ideas naturally had developed. On a trip to Copenhagen, leather works shop Skindhuset was visited and many necessary tools and a leatherwork book were purchased with an approximate total of 80 euros. The following ideas of methods of attaching were gone through: punching a hole and attaching with rivets, different hand sewing techniques, hole punchers, different types of threads. The following tools were

used in the final prototype: hand sewing leather needles, hole puncher, a hammer, a wooden board, bee-waxed thread, bees wax, a prolonged skiver, an edge beweller and a pyrographer. The pyrographer was purchased from Lidl under a title *wood burning iron*. Receipt of the purchase was not anymore available but an estimation of the price would be between 10 and 16 euros, such a tool is currently for sale in for example clas ohlson. In addition, a few more hand tools were purchased for the project from local hardware stores.

3.5 Process and testing

As mentioned in previous chapters, there were problems of sourcing the material; it was difficult to find a place that sells vegetable tanned reindeer leather. It was finally ordered from Kemin Nahkatarvike Oy. Naturally made vegetable-tanned leather was not found available for purchase. In the following sub-chapters the process of ideation is construed.

3.5.1 Sketching

The idea of the toy was to make forest animal characters by having a shape and an illustration on it. Since the beginning there was the idea to choose local animals from Finnish nature with specifically reindeer, lynx, bear, fox, wolf and owl in mind. Among them at an early stage the animals' bear, fox and owl became favorites. All of the chosen animals have been in trend for a while now, possibly because they are so nice to draw and ideate into cute illustrations. I saw now harm in using them in this project as well, as long as I did not choose them for their trendiness. They are also easily recognizable for the children. A few other animal characters would anyhow follow if the toy concept were taken forward into production.

A good piece of advice got during practical training placement at Vanha Koulu design workshop was that in effort of not to repeat the existing designs, one should draw them out on paper to get them out of one's mind. Surprisingly, it was discovered as a good method and was followed here as well. In personal opinion and note, it has been found out that the designs one has seen are easily repeated by accident, hence they are in deep memory and unknowingly repeated. Especially lately I have seen, for example, several fabrics of the same subject with illustrations resembling each other surprisingly much, so it is something to be aware of. This is to be separated from the

clear cases of intentional copying, like the first Marimekko scandal this year spring. So at an early stage a small research was done with Google image search to remember and acknowledge the existing imagery on the subject matter and doodle on paper, out of blocking the mind (Figure 9).



Figure 9. Existing designs doodled on the right side page with black pen, except for the laying bear which is drawn from a photograph. Bear heads on left side are own detail ideas.

The actual ideation sketching begun by looking at photos and video clips of the animals and drawing realistic sketches from them to discover the identifying features of each animal (Figure 10). The sketching process simplified the looks of each animal from realistic into illustrational. It has been a personal problem to be afraid of so-called *ugly doodles* and sketches and in this project it was taken as a challenge to be liberated from it and make fast ideation sketches. Quick sketching is a great way of finding good ideas that would be lost if one only tries to make beautiful sketches. The idea of sketching ideas is not the sketch itself but the idea. At this stage the quantity is emphasized and the quality comes later in the process.



Figure 10. Realistic sketches of a bear.

In the illustrations I was heading for a clean lined, simple look, also so that it could be easily repeated on the leather with a pyrographer. With the clean lines and simplified design it would be easy to make alterations and special limited editions. For example the bear could be made fuzzier, on the whole body or just the face, as can be seen in some of the sketches in the appendices. I looked for a style that feels my own and that each character seem like they belong to the same group. The animal characters have a touch of persona and playfulness to them, so in this case simple is in no means clinical. The characters have to look appealing to the eye and invite the user to play. At a later stage of the sketching I concentrated on different types of heads, eyes and the position of the eyes (Figures 9 & 11). Finally, I sketched the layout ideas of the characters on the pattern, and some details (Figures 12 & 13).

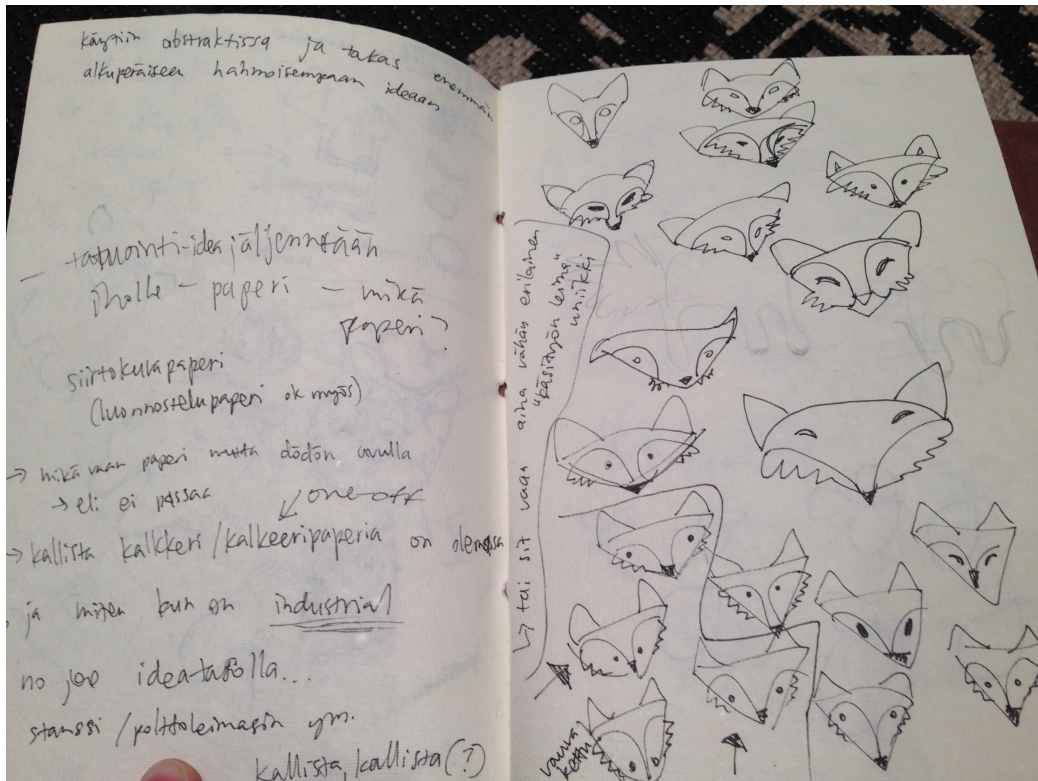


Figure 11. Sketches of fox heads.

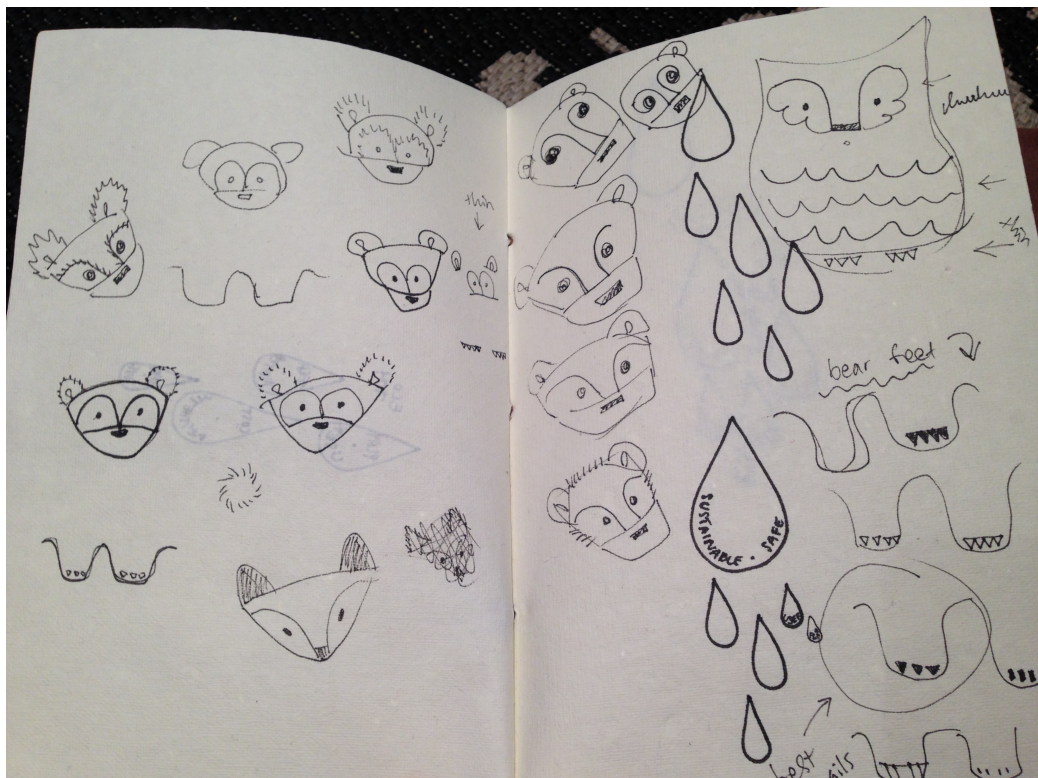


Figure 12. Sketches of bear heads and feet.

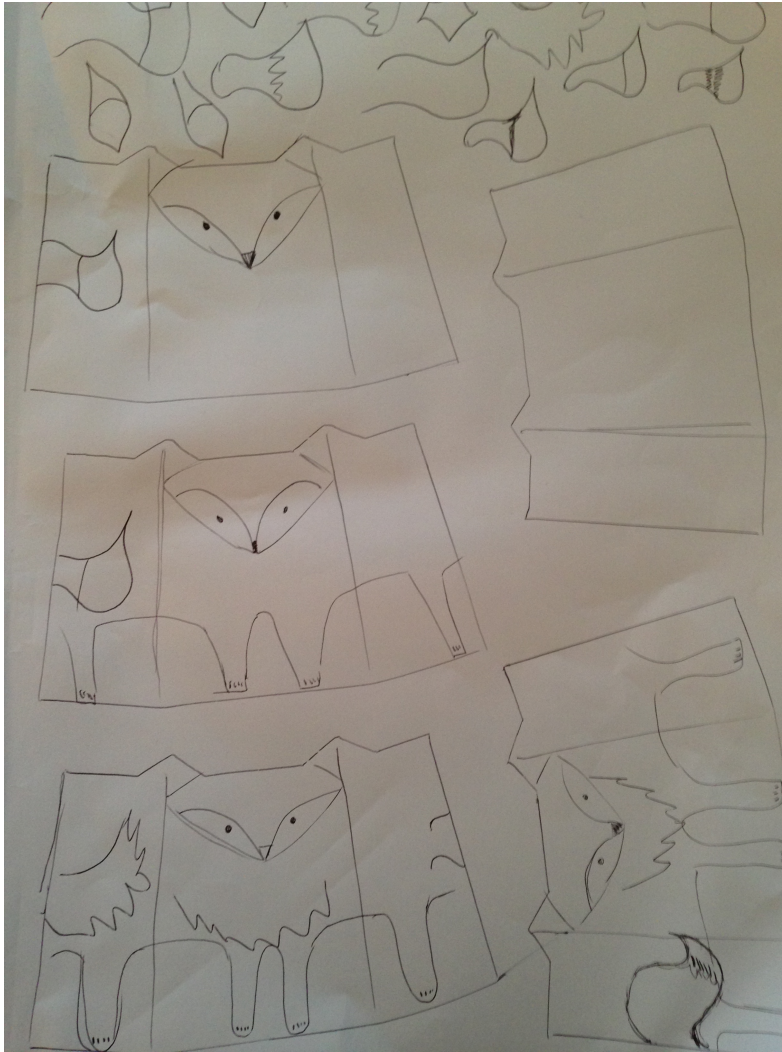


Figure 13. Fox layout plan and tail details.

3.5.2 Shape

Originally the shape of the toy was going to be constructed from two pieces with a long seam to sew in a rather difficult shape. After 1.5 years and coming back to it, a more simplified shape was approached. Firstly there were ideas about a very abstract shape without having to sew, a flat circle or a square to be shaped with the help of rivets or a leather string (Figure 14). That was found to have too much material in it, making the item very wavy. The waves would hide the image of the animal and the looks were not as wished for nor suitable for the purpose of play. Leather is an expensive material, and in any case in making something ecological, the material should be used efficiently. In this case, unnecessary amount of material was used with undesirable result.



Figure 14. Simple shape.

To eliminate the excess material two approaches were taken, first approach being to cut a slice off the flat square or circle. The shape became first four and then just three triangles combined together, leaving one seam to the side. The four-sided one with enough large surface size for the image, pyramid shape, was too flat so the three-sided version was created (Figure 15). This approach was taken to the end by making a leather version as well as trying the pyrographer on the shape (Figure 16). The pyrographer worked out, the triangle shape did not. It became too much of a so-called key-chain resembling object, it was too abstract with a simple shape and an attached image that was different language from the shape, not related to it. In the second approach this shape was further developed with cutting a hole in the middle of the flat circle to enable easier folding of the shape. There was still too much material and it would also have created a material waste of a small round shape.

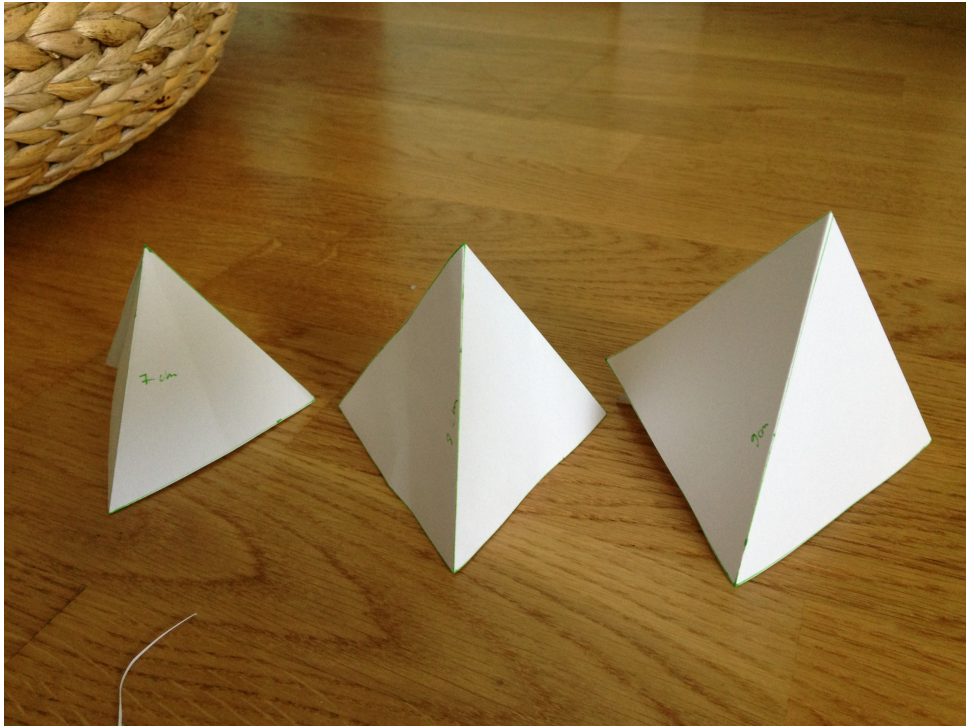


Figure 15. Three-sided “pyramids”.



Figure 16. Trying pyrographer on triangle shape.

The two approaches did not reach the criteria and the whole abstract shape idea was abandoned as a failure. Even though the two approaches failed, it led to the final shape idea which became from a combination of both approaches; circle cut and slice off (Figure 17). The shape became a sort of a fat C- shape. The top created a perfect sharp ear shape resembling the owl's ears. It had been the idea at an early stage to have the ears of the animal in the shape. The rest of the shape was molded to make it more resembling to the owl shape from the sketch, Y-shape, and a pattern was created from the measures (Figure 18). This brought the shape back towards the character type shape in the beginning, but as more simplified and tailored to the animal in question.



Figure 17. Fat C-shape.

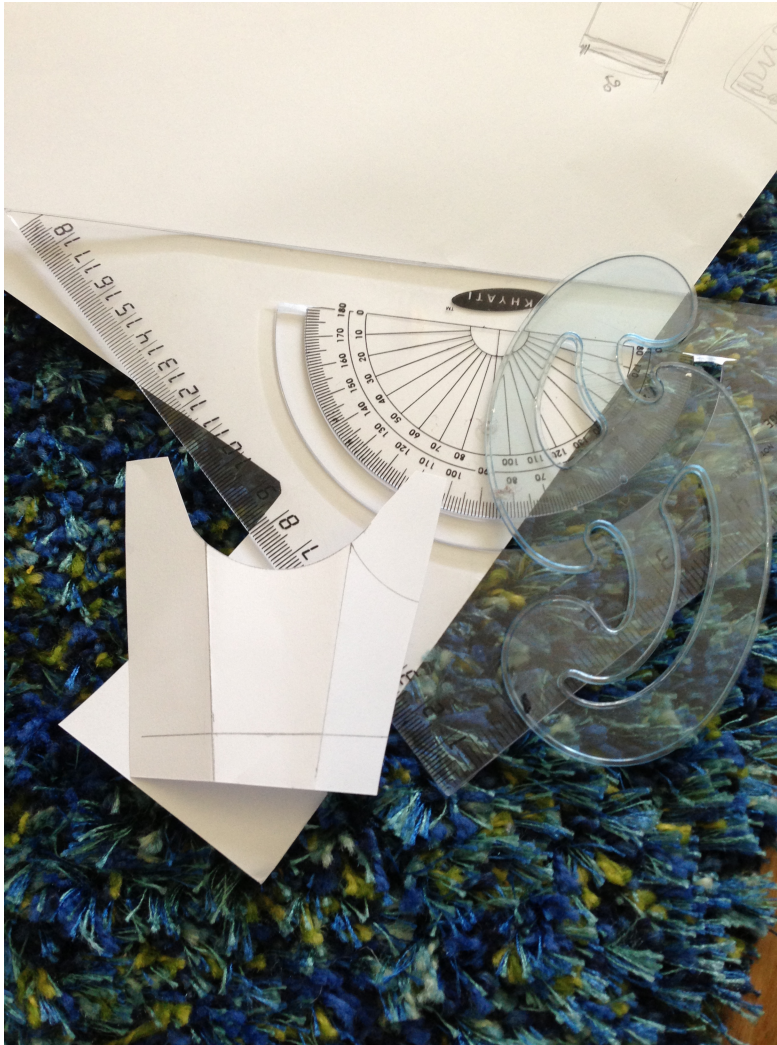


Figure 18. Pattern of owl.

Possibilities about the bottom piece were thought. Ideas rose about having the same piece or a separate round piece attached to the bottom, or perhaps a shape that allows the fingers in, making it a finger puppet. The last one of the mentioned was forgotten instantly since it would make the image of the product too cheap in comparison to the material price. The same piece idea did not seem to work out either as it would have created an awkward shape to cut and attaching point would have been so small that it was all the same to have a separate piece for the bottom, unfortunately meaning a couple more stitches to sew. It left the construction to be the following: one seam on top, one on the back, one to attach the bottom and to fill it up with stuffing, which was first thought to be dried peas. Overlapping pieces attached to both sides, with no separate piece in the bottom was also considered but it would take double the material. As a different approach to filling the toy with peas, was an idea of using a piece of wood to both create the mass to it and to eliminate the need for a sewn bottom. Such wooden

piece cut to the exactly right angle and right fit with equipment unavailable would become relatively expensive and it would require a subcontractor. Attaching the two pieces, leather and wood, would have been more challenging as well as nails can not be used in a toy. The benefit to cost ratio was not agreeable.

As for hygiene and cleansing reasons the dried peas could not be used, alternative stuffing was thought. Dried peas were considered excellent for the heaviness, it would be ideal that the toy could stand up and be sturdy for playing purpose. Most usual material for stuffing in stuffed toys is 100-per cent polyester. Perhaps recycled polyester could come in question but as that fights against the principles of cradle-to-cradle ideology of keeping the natural and synthetic materials separate for easier recycling, possibly then crude lambs wool would be more proper. Crude lamb's wool also is heavier than airy lightweight polyester. The question remained will that make it sturdy enough, thus ideas came up about inserting a piece of wood inside the toy to increase the weight along with the soft stuffing.

After the pattern making, the owl shape was constructed from recycled leather for a mock-up (Figure 19). Prior to it the sizes of the owl and the other animals, bear and fox, were thought. Brown bear in reality is minimum height of 90cm (Metsähallitus 2009), Red fox is maximum 40cm and a Barn Owl is on average 35cm (Pedersen 2011, 17, 33). The real sizes of the animals were rounded up to heights of 30cm, 60cm and 90cm, and those were used to create a scale for the toys. Even after rounding up the figures the size differences were too big as it was necessary to consider the smart and economical use of the material as well as the functionality; not too small for choking hazard, not too big for child's hand. The owl was tiny and the bear was big, so the fox size staying the same the bear and the owl were sized halfway towards the fox's size, approximately the sizes then becoming 45cm, 60cm, 75cm, if considered in real life scale (Figure 20). Perhaps no longer so believable in reality, but yet in the right order and with enough difference in between. It is necessary to have some scale related to reality when making animal toy figurines, in both personal opinion and in an educational point of view. Size also creates contrast, and contrast is essential in design and aesthetics. In the prototypes the heights are 11 cm, 9.5cm and 8 cm.

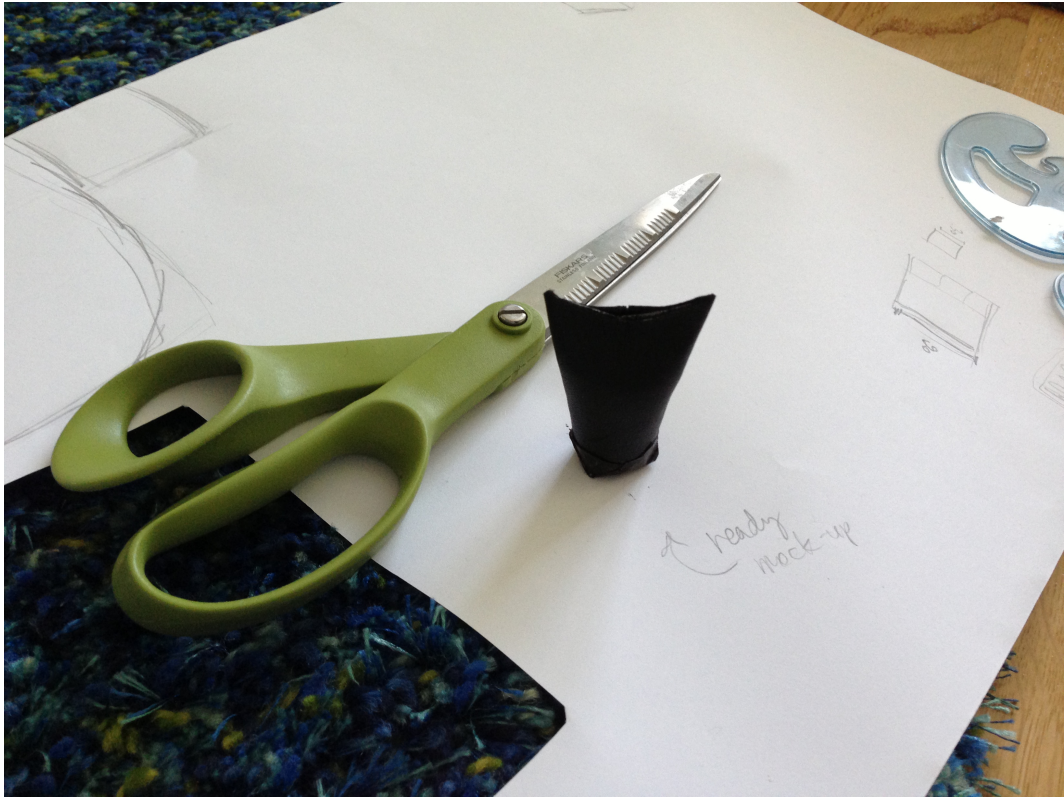


Figure 19. Small mock-up of the owl.



Figure 20. Scale of the animals.

Creating and adjusting the scale, the owl became bigger thus having to remake the pattern. Before taking the new pattern forward into prototype, the thoughts continued in ideating and patterning the other animals, firstly bear. The bear shape had to be more three-dimensional than the owl, and real bears also have a prominent hump in the back of the neck and that needed to be taken into account in creating the shape. After a few ideas and trying shape molding with paper models, I found an idea was found about attaching a triangle shape to the top in effort to create the hump. The triangle is a continuance from the head so as it is not a separate piece, it did not create any more stitches to sew than without it. Creating the bear from paper model proved to be very challenging. After seven paper model attempts (Figure 21.) I finally realized to make a clay model of the bear and cover it with masking tape, then I cut the masking tape at where the seams would be, took it off the clay model, so I got a pattern of the bear.



Figure 21. Models and ready patterns.

To be able to make the drawing of the character on leather more efficient, speedy and precise with the pyrographer, an idea was thought of using guides in making the outlines. Material options for such guides were leather and wood, as those materials the pyrographer can be used for. The same idea could also be used in making more per-

manent patterns for cutting the shape from leather, traditionally in leather glove making it has been thick cardboard. It is possible to either use a guide and cut along it, or to use a pattern to draw the outlines on the leather and then cut.

3.6 Prototype

3.6.1 Technique

The prototype was made with the technique described below. The leather was set on top of a wooden board and with the help of patterns the shapes were cut out with a prolonged skiver (Figure 22). The layout of the illustration was planned by drawing many patterns of each animal on a big sheet of paper and then tried different possibilities (Figure 13). Decisions of how the final illustration layouts were to be on leather were made based on two different things: how it will look when the toy is sewn up, thus to create a feel of dimensionality and realism when looking also from the back or side of the toy, and secondly all of the animals should have similar features thus to create a feel of a group, a set. In the photos of the ready prototype one can see that the line of the eyes are similar and also the other shape language.

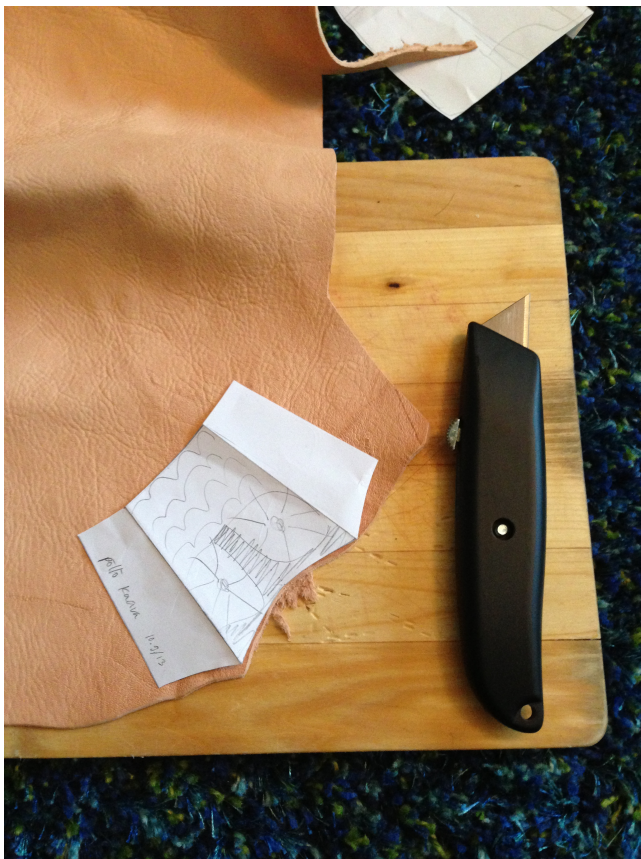


Figure 22. Cutting out the pattern with a prolonged skiver.

After deciding on the layout, I made trial pieces with the pyrographer. Trying to do it by free hand was extremely difficult so I made help lines (Figure 23) with an etching pen, it is not an actual pen, but has a sharp tip thus it made a faded compressed line on the leather. When even that did not offer a satisfactory result, the guides mentioned in previous chapter had to be made. As the base of the guides I used the just made trials. After some planning of changes and drawing them on the backside with a marker, I cut the guiding line by scissors. With the help of guides, making the lines with the pyrographer was much easier and more stable (Figure 24). One has to constantly move the pyrographer, because failing to do so will lead to an ugly over-burned spot. One would need to practice a lot with the pyrographer to reach a precise result.

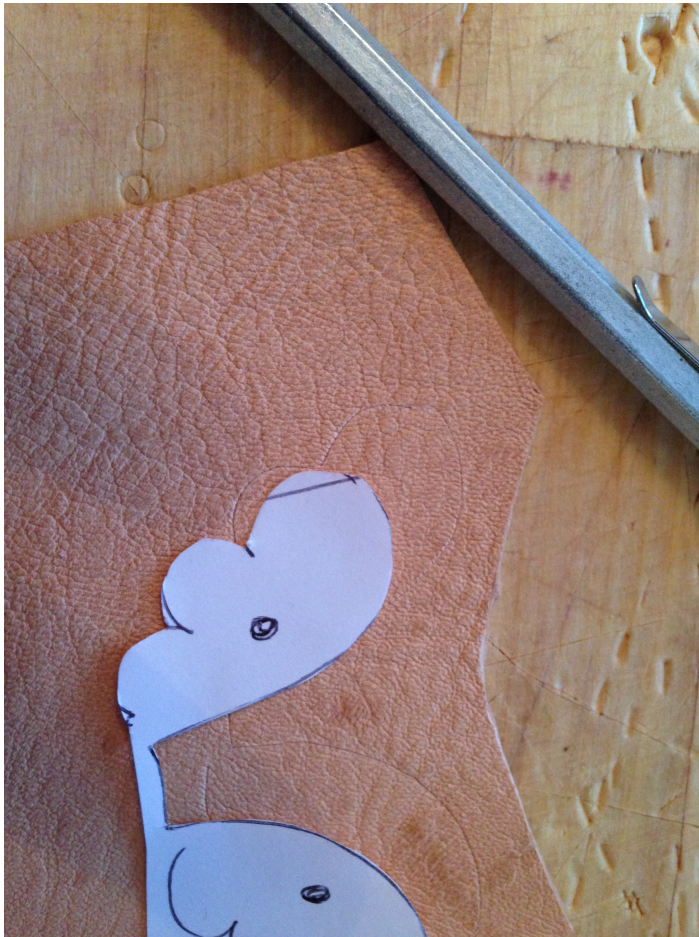


Figure 23. Help lines made with an etching pen.

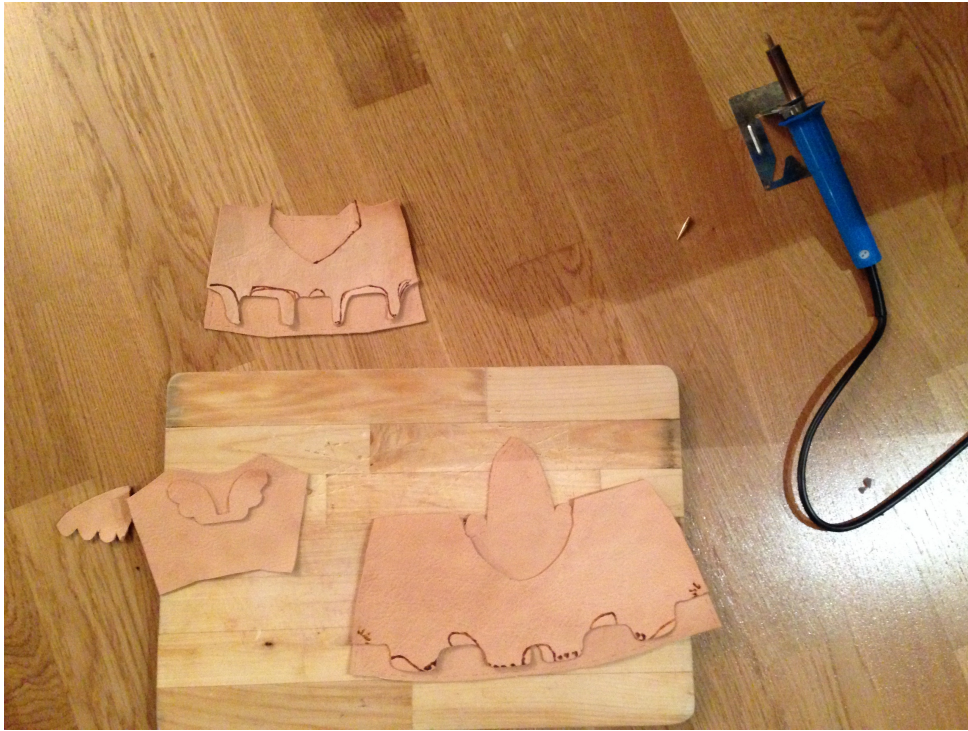


Figure 24. Drawing with pyrographer with guides.

Drawing with the pyrographer generated thoughts of whether that idea was as good as thought. It makes a bad smell thus the work area should be well ventilated and the lines are easily burned too dark thus the item itself will smell. As the leather is vegetable-tanned, it can be burnt safely, but the fumes still are neither good nor pleasant to breath. In consideration of further process and production, perhaps it would yet be better to try if embossing or de-bossing would be a better possibility in the end. That certainly would not be harmful for children, whereas now it would have to be examined to find anything coming off from the burned illustration. Unfortunately, neither time nor specialized equipment were at hand to try that idea at this stage.

The first attempt with pyrographer was done all in same thickness; it proved to look too dull thus plans were made to use two thicknesses. First testing on paper with two different thickness markers to find where to use which thickness and then performing that plan with the pyrographer also. With the guides, I first drew the thicker lines: mostly outlines of feet and part of head. The more detailed part of head and the nails were made with thinner line. This had to be done in two stages, as the pyrographer must be allowed to cool down before changing the tip.

Before sewing the piece up, holes for the stitch were punched with a pricking iron for the back, top and under seam. Pricking iron is a special tool for making the holes for stitching leather, it looks like a fork and one must punch it with a rubber-head hammer (Figure 25). One should not try to hit through the leather instantly with one punch but with several, maybe up to four punches. The piece was sewn with leather needle and bees waxed thread with saddle stitch on top and back, leaving the bottom piece open (Figure 26). The seam allowance was left on the outside as that creates an interesting detail, makes the toy sturdier to stay in shape and stand, and makes the sewing much easier and faster. It would also have been possible to make a flat seam but it would have taken more time and thus increase the costs.



Figure 25. Making holes with a pricking iron and rubber-head hammer, also an etching pen visible.



Figure 26. Pieces sewn from top and side seams with saddle stitch.

The prototypes were filled with stuffing. *Bear ate a lamb, the owl saw it and also ate some*; thus they had felting wool as stuffing, as that was available for purchase in the local Taito Shop instead of initially thought crude lambs wool. *The fox ate a duck*; there was an old feather pillow at home that was used to test of that as stuffing as well. The problem with feathers is that they keep coming out through even the smallest holes, not even starting to think the possible ethical or sustainable problem issues. However, there could be some idea of using old pillow and such items' stuffing in possible small-scale production, but it has its challenges. Also one piece without stuffing or sewing was made, instead it was attached with two metal studs. Such a construction would be much cheaper to produce. Ready prototypes were taken outside for a photoshoot (Figures 27 & 28).



Figure 27. Toy animals in the wild.



Figure 28. Toy characters on a voyage.

3.7 Production methods

To enable small-scale mass-production the process of cutting and sewing should be further developed to speed up the process and minimize expensive handwork. Cutting the leather could be speeded up with a die, which is like a cookie cutter but for leather and is used for example in making leather gloves. A die would need to be made to measure and could be costly but a mechanical press that is needed to punch the die to cut the leather is accessible, as my parents have one at their home. While sewing the prototype it became evident that the production method would have to change from hand sewing to machine sewing, that would mean having to either buy thinned quality of the leather or skiving the leather thinner from edges. The chosen method of having the seam allowance on the outside would make it easy to sew the piece up with an industrial leather sewing machine, even by a subcontractor if that would prove to be more cost sufficient. A bench-mounted edge skiver would be a faster machine for making the leather edges thinner for sewing rather than using the manual flat angled knife, but purchasing that would require more investments and depending on whether it is manual or electrical one, could be resulting into yet another electricity consuming machine. The illustration made by a pyrographer could be made faster by hot stamping or using another method for making the image. In effort to suit the low energy consumption criteria, the preference of machinery is to be merely mechanical without any need for electricity, when that does not raise the costs too much. As the hand sewing should be partly or fully replaced by machine sewing, it would require electricity and it should be arranged in the most sustainable way by purchasing green energy such as wind power.

3.8 Price

The price of the prototypes made was very expensive as the cost was high, having to purchase specialized equipment and the prototype making was time consuming. Just the hand sewing of the toys took four hours. The first pieces always take the longest and after practicing and when all the steps are known and speeded up, the whole process of making would be much faster even as hand sewn. What it would come to actually making the items by small-scale mass-production, not all the variables are available. The price of the leather piece was 5.50 euros per square foot for the second quality vegetable-tanned reindeer leather that I purchased for the project. In my under-

standing the second quality label comes from the outlook of the leather, there were some scars on the animal from for example horsefly bites. Personally I found the quality fit for the project purpose and the defects were minor. The first quality costs 6.00 euros per square foot. The purchased leather piece cost 12 times 5.50 euros totaling to 66 euros. In the previously mentioned (Chapter 2.4) project *Sisnaa, poronnahkaa*, they carried out calculations to find out a price for the naturally made reindeer leather, *sisna*. The price was 75 euros, including the costs of making and the pay for the maker but not any company profit. The real price would then be higher and the price counted was on average per *sisna*, not per square foot, which leather usually is sold by. If the price difference between vegetable-tanned and that of naturally made would be only 10 euros that is not bad. In any case the material is very expensive to begin with. From the projects 12 square-foot piece one could make on rough estimation 11 times the set of 3 toy characters, giving each set the material cost of 6.80 euros, by using the 75 euros price per *sisna*. Not having the other price affecting variables available, the price estimation could not be completed in the context of this thesis.

4 RESULT ANALYSIS AND CONCLUSIONS

4.1 Project

The organization and execution of this project left many things under improvement. One issue causing delay in the design process was related to finding and gathering the material and equipment for the productive part as it proved to be challenging. The beginning of the process was delayed by the struggle of trying to find an outside client. Being determined to have a client but also set on the subject of sustainable design, wanting to create something ecological out of a virgin material, made it difficult. Being able to find many Finnish companies that use recycled material in creation of new; companies that use new ecological materials were scarce. In the end it was decided that this final thesis would have an entrepreneurial viewpoint. The schedule also suffered from a life change; having a child, providing some impossibility in holding the initial timetable. After the parental leave, the new schedule (Figure 29) was tight and the time available for the work was very limited due to personal life. That restricted the possibilities and defined the borders of the work. Even more research and more trials on the design would have made if resources were provided.

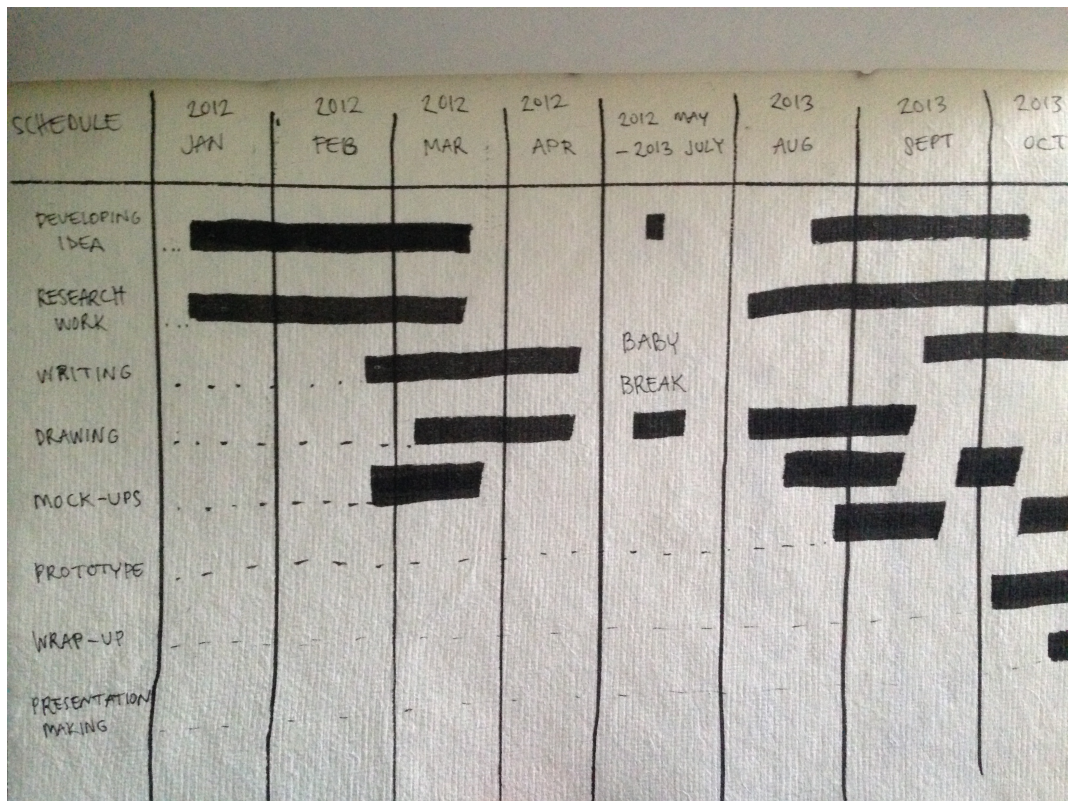


Figure 29. Schedule.

As the client in fact was myself, there were struggles with the overall brief as well as the process along the way. It would have been good to have an outside client to set deadlines as well, but in my life situation it might well have proved to be too stressful in the late pregnancy and disappointing to the customer hence staying home for one and half year in between of the project. Inability to get feedback from a client was a definite downside and concerning that, the possibility of consulting the final thesis supervisor and other teachers turned to be essential for the proceeding in the work. Having a child resulted in a vast first-hand knowledge about playing, toys and developmental interests of a child, which were very helpful during the process.

One problem faced during the writing process was missing references; some references were not noted down and one and a half year afterwards finding the same reference proved to be difficult, not the least because of lack of access to books of the field due to geographical distance and the lack of time to order the books here. Another problem was the lack of access to specialized tools as I live far from the school. All of the tools had to be bought which limited the possibilities to hand tools and even those were not easily available, just so it happened that I passed such a shop on a summer trip to Copenhagen. It was much easier to know what tools are needed for the project

after consulting a sales person. Otherwise the tools are available online, and even then the nearest online shop I found is located in Sweden. Leather craft is not such a popular hobby at the moment. During the late stages of making the prototype I realized that some tools are missing and I was able to find some by using imagination at the hardware stores, as it turned out, many of the tools used for woodworks can be also used with leather crafts.

At the beginning of the project the idea was to make a smaller research and concentrate on the design, thus to make a production-oriented thesis. The research part expanding and each finding resulting to the need of further research changed the course of the thesis making it more research-oriented in the end. The design production part became smaller and somewhat unfinished in the sense that the prototype was not made in such way that the product could be released straight to the market as it is. Yet I was thinking, that must not be the idea of the prototype after all, or maybe the idea of the *final prototype* it might be. In the next chapter the product's final prototype is verbally pondered upon.

4.2 Product

Concerning the safety of the pyrography illustration, for the maker it is safe when the leather used is vegetable-tanned. As what comes to the user, the toy would have to be examined in laboratory to find out if there are microscopic pieces containing carcinogens coming off from the burned image. If this were the case, the image could be embroidered or embossed instead. Embroidery would give an opportunity to bring color to the toy, good for children's preference and aesthetical appeal. Embossing in the other hand is more difficult approach; it would be more challenging, as it does not offer as much of visual contrast.

My very own one-and-a-half year old test-user was interested in the products even as unfinished, at the stage where I had done the illustration with pyrographer and the piece was unsewn. The interest was by picking it up and looking at it with a manner that signifies as being interested. She also could recognize the character instantly as an owl as she said "hu-huu", mimicking the sound owls make. When the toys were sewn but did not have filling she put her hand in it and played as if they were hand puppets. In next steps the product should be tested by a larger test-group of both children of

different ages and adults, the group could be made smaller by using the target audience for the product: eco-conscious trendy urban families.

Another important step, maybe the first one in line, would be to calculate the cost for the finished product and to make a research whether it becomes too expensive and if so, what can be done with production methods in effort to lower the costs. One cost lowering method could be leaving the toy without a bottom and filling, then it could be used as a hand puppet if wished so and erasing two steps and the cost of the stuffing. Also the sustainability of the toy should be calculated, for example the carbon footprint, and seen whether or not it truly is sustainable production.

It is a possibility that the final product could not be the same as the prototypes made in this project in effort to fit the safety regulations. In case the use of bees wax is out of question, the necessity of it would be diminished by machine sewing, thus the thread would not have bees wax and by using none or an alternative surface treatment. Possibilities of using a vegetable-based oil for treating the surface should be examined or leaving the surface without treatment, which might result in watermarks on the leather after baby drool. That could also give it an interesting patina but leather gets rigid after drying and that is not a desirable feature in this context, anyhow, little bit of drool is not harmful. While researching alternative treatment oils for leather, I found linseed oil to be used as one. It is and can be used also for wooden cooking items like chopping board and cooking utensils so perhaps also for things that children might chew. Unfortunately time run out to research that in more detail. If the final product had bees wax, perhaps an age limit suggestion of “not recommended for under 1-year-olds” would be satisfactory. It might be that below the age 1 children are not so interested in the product in any case, as it is not so bright in color nor makes any noise. They might also like it as it has an interesting texture and a pleasant scent of leather, clear illustration with enough contrast, a few overhangs like the ears and otherwise round and cuddly, firm to hold and get a grip but yet spongy feel. In any case it would be nicer if the final product would not need to have such restrictions but could be used by anyone at any age.

If the possibility of cleansing the product by wiping it clean with microfiber- or damp cloth is satisfactory according to the safety regulation authorities and if after the required tests on the leather it would be found safe from chemicals, the material used

could be leather thus making the product possible for production. All the other features like stuffing, surface treatment, thread material and illustration method can be changed to meet the safety regulations. The existing product methods used in prototype could be made use of in exact same way in another type of product, for example making an iPhone pouch. In such a product one does not have to take into account the possibility of the user tasting or drooling on the material and whether such action is 100 per cent safe to do.

If it were the case that producing a toy out of leather was not found possible, a similar idea could be conducted from wool felt as well. The outlook and feel is completely different, but the material is also thick and rigid, it can be sewn in similar method and like leather also wool felt does not ravel. The illustration would need to be embroidered or cut out. Wool felt is so thick and heavy that possibly it would erase the need for stuffing, which would lower the costs along with the cheaper material price.

Overall the project was very challenging and at the same time interesting. There were surprises and the biggest of them was that the thesis changed from production-oriented into more research-oriented. The produced prototype was not what I expected it to be; it is not ready for production. The restrictions and limitations related to toy designing were unexpectedly demanding but gave me an interesting perspective of the challenges that lay ahead. Because the project did not go as I expected it to be, I learned so much more than if it had.

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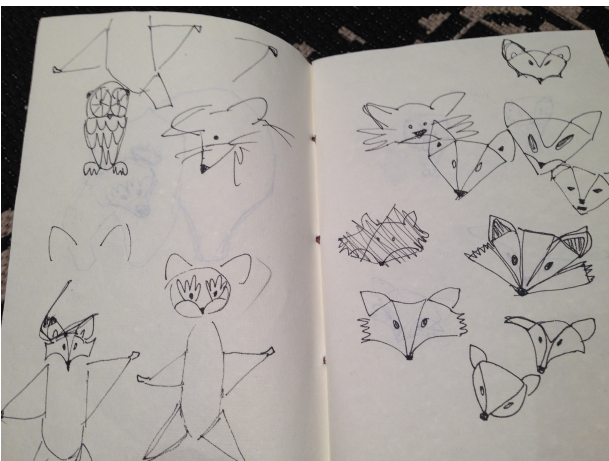
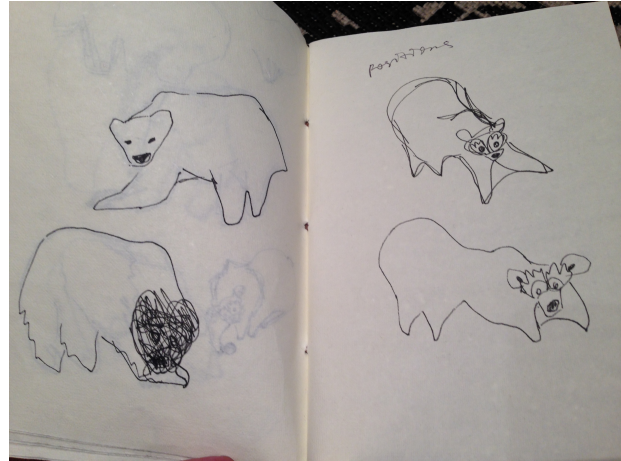
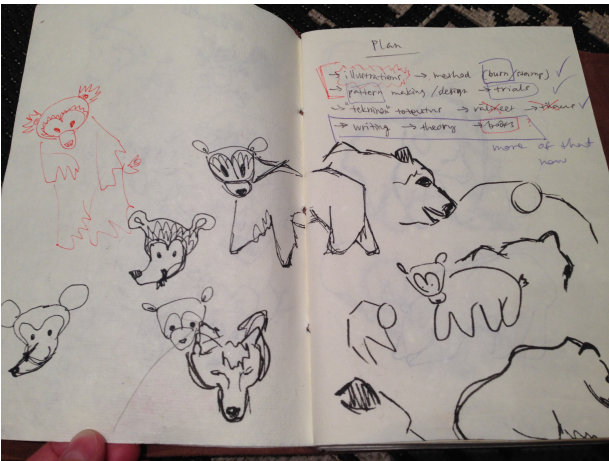
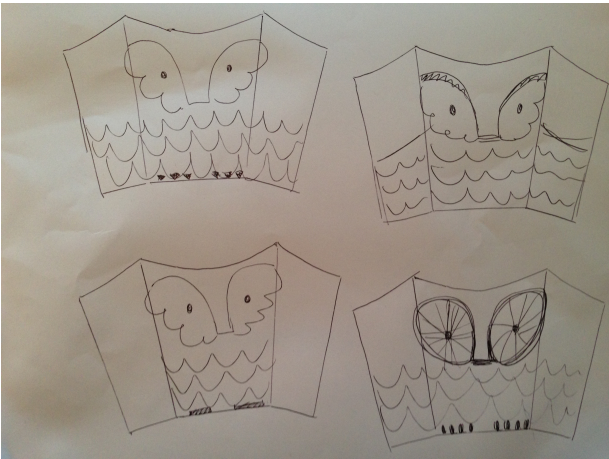
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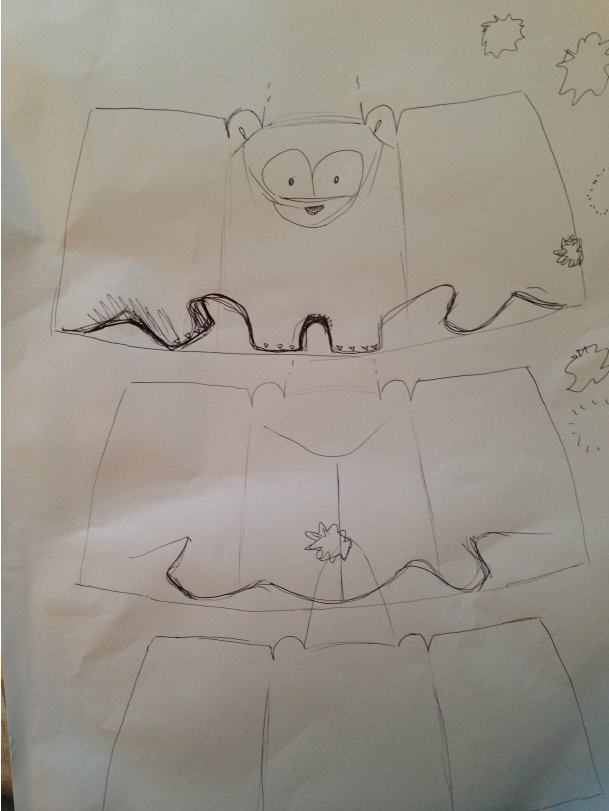
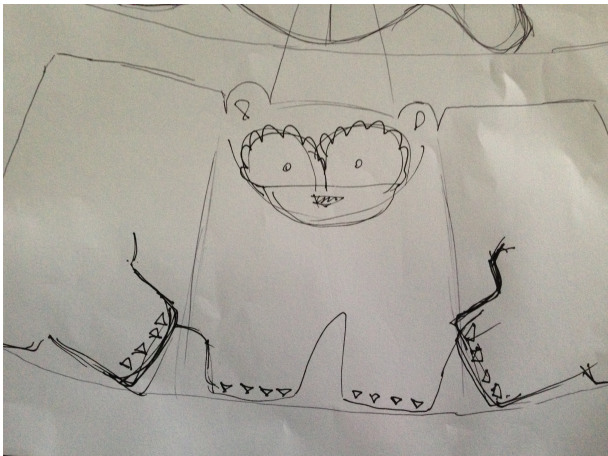
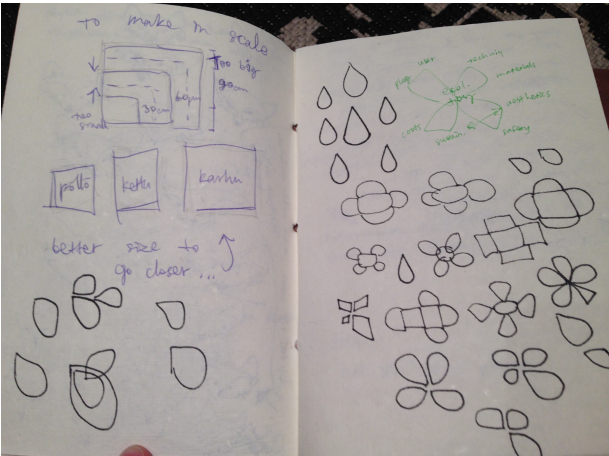
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All other images and illustrations by thesis author Johanna Tuorila-Ravi, 2013.

Appendix 1/1 Sketches



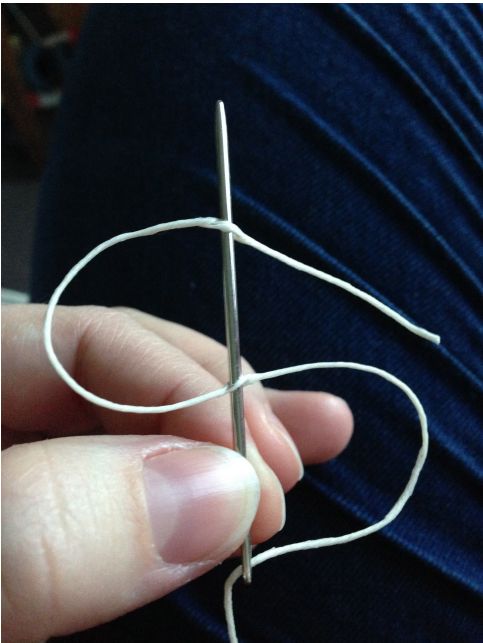
Appendix 2/1 Sketches



Appendix 2 Process photos



Appendix 3 Locking the thread



Appendix 4 Prototypes



Appendix 5 Toys being tested

