THE PATTERNED THREAD
- new textiles inspired by ikat -
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Title
The patterned thread
- new textiles inspired by ikat

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Abstract

The work of this MA thesis develops a new approach to hand weaving in which the design process is led by the technique of resistant dyeing. The process is inspired by the visual properties of traditional ikats. It follows the technical ikat procedure of primary resistant dyeing and subsequently weaving. Within the research a new way of weaving is explored in which the dyed thread dictates the weaving process and therefore influences the weaving motif. In addition different design variables such as material, binding pattern and finishing are used to push forward the developed concept.

The aim of this work is to explore new aesthetic expressions between regular and irregular motifs through the application of design thinking.

The result presents an innovative approach in the ikat technique in order to create random distributed patterns and how they can be already influenced in the stage of yarn preparation.

Keywords: ikat, indigo, resistant dyeing, craft, hand weaving
1 INTRODUCTION
1.1 INTRODUCTION TO THE FIELD

The term 'Ikat' origins from the Malay-Indonesian word 'mengikat' which translates into English as 'to bind, tie, or wind around'. Ikat is a specific textile technique in order to create pattern in textiles. In the process the threads are resistant dyed prior to the weaving process (Steele, 2005). The term was first introduced by Dutch ethnologist Rouffaer around 1900 into European languages (Larsen, 1976). In other languages other words are used instead of 'ikat'. In Japan for example they are called Kasuri, from the verb 'kasureru' which translates 'to blur' (Tomita, 1982) and refers to the aesthetic characteristics of the woven fabric in the final stage while the word 'ikat' focuses rather on the technical aspect of production.

This ancient ikat technique has a long history and rich cultural heritage within indigenous tribes all over the world. The term is a synonym for a textile process that combines the technique of resistant dyeing and weaving in a complex and unique way in order to produce patterned textiles. While the Ikat process is spread all over the world, it is uncertain if its origin evolved in a particular area or if the technique emerged separately in different locations. While the principle is generally the same it differs in terms of design, material, usage and technical details (Crill, 1998).

The ikat process demands a high level of expertise to master the different levels of production which starts with the wrapping preparation for the resistant dyeing. This process involves a complex procedure of carefully sorting the threads (before and after dyeing) and systematic wrapping and unwrapping the areas which will be resisted or dyed. Furthermore it involves particular care in the setting up of the warp and weft on the loom to ensure that the pre-dyed sections appear in the right place in the finished cloth. In the final stage the threads are woven into a cloth. Extraordinary precision is needed throughout the whole process.

Due to the specific procedure ikat textiles have a distinguished characteristic (fig. 1) which can't be achieved through a different textile technique. In many ikat traditions the characteristic softly blurry appearance of the motif is the desired effect which is achieved through the dyeing process. There in the first stage the dye creates a gradation in colour in the ikat-dyed thread which is the result due to the difference of penetration of the dye in the resist bonded areas. The other reason for the particular ikat effect is through putting up the warp into the loom - the patterned yarn shifts and creates a displacement of the motif. This irregularity in the pattern alignment is different treated in different ikat traditions all over the world. In the double ikat production in Gujarati (India) the value lies in the great precision of the clear outline of the detailed motifs in the patterned warp and weft threads (fig. 2).

fig.1 detail of some ikat textiles with the very typical characteristics of “blurry” motives, part of the Gösta Sandberg collection at the Museum of World Culture, Gothenburg
While for example in the Japanese ikat tradition the desired effect is sought out through ‘accidents’ in the blurred textile pattern by exaggerating the displacement of the warp yarn (Stack, 1987). Next to the aesthetic expression which is caused through these disruption in the motif, different cultures have further differences in the material, colours of dye and technical realisation. In India the colour range is more varied and silk is mostly used while for example in Japan the Katuris is traditionally a cotton fabric that is dyed with indigo.

Nowadays the term ‘ikat’ is also used for textiles which copy these visual characteristics. As the production of a traditional ikat is labour intensive and time consuming. In some variations of the ikat process the motif is printed or painted on the warp instead of dyed. In mass production the ikat pattern is printed on the already woven cloth (fig.4). Nonetheless these imitations of traditional ikats lack the same level of artistic skill and aesthetic value of the traditional ikats.

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In the industrialized world of today we don’t seem to have space for handcrafted items, but there is a huge potential that lies between the digital or industrial tools and the knowledge of a craftsperson (Hemmings, 2012). I have a high interest in how traditional crafts can be transferred into a contemporary context and how they can give guidance to develop something new and unexpected. Through my craft based education during the bachelor studies it was possible to explore different craft techniques and to approach them in a new way.

Today the term ‘craft’ is used for a diversity of practices but literature discussing it is rather sparsely, especially when it comes to intellectual writing. The main characteristic of craft is the craft maker’s dialogue with the material. Thereby the practitioner performs the process of making – demanding craftsmanship, skill and technical knowledge (Veiteberg, 2005).

Craft declined in the progression from the industrialisation to today. In order to remain its meaning in the 21st century, it must move away from its ‘nostalgic and sentimental view’ and embrace its value to push designers and makers forward. The correlation within the phrase ‘modern craft’ is to be seen as a challenge or provocation towards a complex topic: the development of craft as part of modernization (Adamson, 2011).

Especially in the field of textile, here the principle of the basic textile techniques remained the same since their invention. The textile production mainly focuses on mass production, accuracy and uniformity of threads (Albers, 2000). This leaves a gap towards new aesthetic expressions. Therefore hand weaving presents a great way to experiment on the loom with the direct contact to material and textile expressions.
1.2 DESIGN PROGRAM

The design program frames the research field within the scope of the master education at the University of Borås. The degree work presents the climax of this research while the previous design projects #1 to #3 serve the purpose of defining the research area and creating the conceptual frame for the design explorations within the design program. The aim therefore is to investigate the conceptual design possibilities of the reinterpretation of traditional crafts and further specify on the development of new aesthetic expressions based on ikat textiles.

The ikats in the degree work explore the influence of the dyeing process on the aesthetic expressions in woven fabric. The work is based on the ikat technique where the weft threads are dyed in a predetermine motif and in the next step strictly woven into a textile surface. This design project focuses on the aesthetic expression between regularity and irregularity and how it can be already predicted from the beginning – through the different methodical dyeing approach and the determined way of weaving.

In the beginning of this practice-based research the design problem was defined vaguely with the goal to find new textile expression through the starting point in traditional textiles or artefacts of cultural heritage. The design program and the design process throughout the design projects were following Nigel Cross’ (2006) criteria of design – being exploratory, opportunistic, reflective and ambiguous. Therefore the designer needs to explore in order to discover something new. Along the design process the practitioner should constantly reflect on the experiments but leave room for changes to achieve something that can’t be predicted in advance. During the design process this unexpected result is an important criterion. It affected the course of my design decisions since I intended to create a new and innovative approach of a traditional textile technique.

The design program positions itself in the intersection between craft traditions and art with the attention and application of design thinking. Whereas design thinking as the cognitive activity is rather used as a tool or guidance within the design process. Muratovski (2011) expresses ’design thinking’ as the integrated cross-disciplinary research and critical thinking in the field of design. Design thinking is an innovative approach to break through the ‘apprenticeship’ model. The focus in the design process shifts from the development of the technique to the solution of the design problem.
design project #1 - swedish rug weaving

The first design project within the design program was intended to explore the research field by questioning what traditional textiles are. The content was to which extent the choice of material indicates the material as either traditional or modern. The thought behind this exploration was to understand the relation between material and the aesthetic expression in the context of hand weaving. In this project I used Swedish rug weaving as a starting point for the research. The material becomes the indicator of how traditional or modern a textile could be perceived. Could the choice of the material influence the aesthetic expression to get a satisfactory result?

The physical result of the project consisted of various weavings with different material - wooden sticks, leather imitation and industrial felt. The outcome was not as successful when it came to the question if the material can upgrade the aesthetic expression of a traditional craft. But at the same time it became clear, that the research area and the chosen craft needs to be more specific.

The experiments in this project emphasis the role of material and its influence on the overall aesthetic expression. In the degree project I picked up this thought and integrated it in the last stage of my design process.

fig. 5 first design project, using new material and traditional rosepath binding pattern in the swedish rug weaving, material such as wooden sticks, leather imitation and stripes of industrial felt
design project #2 - cross cultural pattern

The second design project focused on a different approach towards the design problem. How can the aesthetic expression of a certain textile technique – in this case the ikat technique – be imitated by other means than the original one? In the original ikat process the threads are following a strict procedure of stretching, tying, resistant dyeing and untying before the actual weaving process. In this project I skipped this process by painting the motif with pigment dye directly on the warp (in the loom) and reconstruct the dyeing effect through brushstrokes or the application of the dye in several stages and different groups of warp threads (fig. 6).

A further approach within this project was to use the technique of the jacquard weaving and imitate the typical ikat expression through a difference in binding patterns (fig. 7). I used the emerging fabric to combine them with different textile techniques such as embroidery and stitching in order to develop a stronger contrast to the traditional counterpart.

The insight of this project was that the investigation of the traditional way of making ikats needed to be deepened further and focused on resistant dyeing and hand weaving in order to find an innovative approach.

The results were constrained colored patterns that turned out the exact way as they were predicted. Since the traditional approach by resistant dyeing promised a more unexpected result I focused in the degree project on the traditional approach.

fig. 6  trials to achieve the ikat ‘effect’ (warp ikat) on the hand weaving loom. exploring ways to imitate the characteristics of ikats by painting on the warp with pigment dye

fig. 7  imitation of the ikat pattern through different binding patterns on the jacquard machine
In design project #3 I channeled my insights from the previous project and approached the ikat technique through a conceptual way by sticking to the original way of dyeing and weaving. This project explored different approaches to utilize the ikat process in a further developed and innovative way. The explorations were made using a variation of different tools and machines such as a computerized loom. I focused on the individual steps within the ikat process (e.g. yarn-preparation, dyeing, winding) and manipulated them separately to see how the change would affect the end result.

This project is used to investigate the potential of the design program and represents the foundation for the degree project. The outcome is a wide range of textile samples that show how the traditional ikat process can be manipulated on a primary level. Based on this collection of explorations the new approach of how the dyeing pattern can influence the weaving was chosen. During the degree work it was used as a starting point for further development and examinations.

**fig. 8** third design project, modifying the traditional ikat process
(above) weaving on computerized loom
(middle) dyeing the warp in the loom
(below) combining handweaving with tapestry weaving by interlacing various weft threads with different material or binding pattern
All the design projects helped me in specializing on a certain aspect of the research and to come up with a specialized work. After reflecting upon my previous design projects within the design program it becomes clear how they gradually developed into a solid set up for exploration, especially in the research project and the degree work. All projects together create a base on which further design decision could be based on.

The value of the projects was to create a familiarity with the topic of ikat in particular and with traditional craft on the whole. This design problem was approached through different angles such as material and different textile techniques (jacquard and handweaving, dyeing/printing) through a directly and conceptually way.
1.3 MOTIVE AND IDEA

In the context of my design program the art-based research is performed in the creative field of textile art/design with the emphasis on traditional textiles and textile process. Using a traditional textile technique is a popular way of starting a design process. Through the process of abstraction it is possible to separate the rules and convention from the textile process to create something new with the visible reference to the original starting point. In my case I decided to use the process of ikat weaving in combination with indigo dyeing as an approach for my research project. The following works of different designers present various ways in how to approach traditional crafts and specifically ikat weaving and dyeing.

As the starting point and ground of comparison I used Wendy Weiss’s documentation of the Gujarati Warp ikat resist method from the artist’s perspective. Weiss recorded the traditional textile technique and reproduced (fig. 9) its concept subsequently in her studio and adapting her pattern design to the traditional way of yarn preparation and weaving of ikat.

Mary Restieaux (fig. 10) utilizes the ikat process to create colourful textiles. She uses the method of dip-dyeing – altering the yarn preparation – to put the colour sequences into the threads and experiments with the feathering of the colours. She uses the concept of ikat production but adapt it to her aesthetic sense. The difference to traditional ikat textiles is in her choice of pattern and motifs. Her work focuses on the interplay of colour and therefore the motifs are limited to the vertical and horizontal lines of the warp and weft threads.

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In the traditional ikat production the choice of the binding pattern is made in regard to the visibility to the dyed yarns in the constructed cloth. The design decisions are made to enhance the motive or the beauty of the ikat process. The choice of binding patterns mostly follows the traditions and conventions of the region but plain weave is used the most. Through the technical progress in weaving looms other variation are used.

Ethiel Steins (Fig. 11) work expresses this interesting approach to the ikat technique. She combines the satin binding pattern with the technique of double ikat. Therefore the threads in warp and weft are resistant dyed in a particular manner and create through the interlacing of the warp and weft a variation of colour intensity. Since the satin is a weft based binding some elements disappear under the layers of weft yarns.

Genni Stafford (Fig. 12) pushes this approach even further. She dyes the warp in a random broad colour pattern and uses the jacquard machine to interlace the warp and weft. This creates an interesting interplay of colour, texture and visibility of the bindings.

In her works Åsa Pärson (Fig. 13) explores in her design works the relationship between the unpredictability of the dyeing process and the mathematical weaving process. From the conceptual point of view she replaces the labour intense resistant dyeing process through dip dyeing. As a result her artwork has a higher unpredictability in the colour gradient and she exploits the ikat process to a higher extent.
Both Pärson and Stein introduce an additional and new factor into the ikat approach - a different surface structure through more than one binding pattern within the same weaving. This innovative step pushes the created artworks into a high contrast to the traditional ikat weavings.

A further and innovative approach to the ikat process is based in the link of the textile technique to the binary coding we use for computers. Sara Diaz Rodriguez and Ursula Wagner (fig. 14) for example created an ikat printer which applies a visual code on a weft thread. Only after the weft thread is woven in a specific wide textile it will expose its information (a picture or a pattern).

The work of PhD student David NG McCallum (fig. 15) explores the connection between programming and textiles, using weaving as a code system. He develops a concept of introducing errors and computer bugs in traditional weaving by manipulating the underlying algorithm of satin and houndstooth pattern.
1.4 AIM

The aim of this work is to explore new aesthetic expressions (between regular and irregular motifs) through the application of design thinking on the ikat process, using resistant dyeing as a tool to dictate the way to create woven fabrics.
The design project explores the interrelation between resistant dyeing and hand weaving within the ikat process and how certain components of the aesthetic expression can be already predicted in the beginning of the making process. The aim of this project is to create an approach of how to produce new aesthetic expression through manipulation and abstraction of the ikat process and the imitation of the ikat characteristics. Exploring the textile properties and how they can be manipulated in an way to create something unusual and extraordinary by focusing on the classical textile characteristics of how we experience textiles – through tactility, pattern, material, scale...

The design process follows a circular and non-linear design dynamic. New insights are being tested and evaluated against the design aim in order to find an appropriate method of resolution. Each stage within the design process creates a variety of approaches which could lead to a solution. While one approach is being picked and developed further the rest will be kept as a constant pool for reference and experience which will affect the final result.

In retrospect the design process could be incorporated into 4 categories: Imitation (reproducing a traditional approach), Extraction (focusing on the most characteristic parts with the highest potential for innovation), Specialisation (picking one approach and develop it further) and Manipulation (testing the approach under different conditions).

The ikat technique is distributed all over the world with differences in their motif, dye applying technique and way of weaving. The differences stretch from a tool of being used to the specific desired aesthetic expression which the textiles should result into. Since my aim of the research was to develop a new concept or a new aesthetic expression in woven fabrics with the starting point in the traditional ikat weaving it was important to create a point for comparison to make the designs decisions. The background of the research is built on the textile collection of Gösta Sandberg at the Museum of World Culture in Gothenburg. The collection consists of 1500 objects. His interest was specially focused on the resist dyeing methods - in the field of ikat, batik, indigo resistant print (swedish: blåtryck/german: Blaudruck) and plangi. The focus of Sandberg is not on a culture or a place of origin or the original application/usage of this kind of textiles.
2.1 DESIGN METHODS AND DESIGN OF EXPERIMENTS

My starting point in this design process was the traditional production method of ikat textiles. The ikat technique is a textile process in which at first the threads are tied off with fibre knots and than dyed in multiple stages to achieve variations of different colours. The area in which the thread was covered wouldn’t absorb the colour dye and remain undyed - creating a pattern in the threads.

The traditional ikat production follows the strict procedure of warp preparation, dyeing and resulting in the textile weaving. I treated the different aesthetics of ikats rather as an inspiration than a fixed guideline in the design process.

I started the investigation of the ikat technique through observing the textiles and the concept of how they were origionally produced. I considered not only the aesthetic expression and the process of producing the ikat fabric, but how each step in the production could be modified or changed. I questioned the traditional weaving of how vertical and horizontal threads are interlaced with each other in order to create a rectangle woven structure.

The reason behind the imitation of the ikat textiles was to gain a profound understanding of how the different components of dyeing and weaving affect the result. It was crucial to comprehend the details of each process and how they can be transformed or used in a different way.

The process of creating an ikat is rather a complicated matter that required skill and experience since the smallest change of one parameter will lead to a different result. For example the modification in the weaving width but with the same pattern in the thread will create a different colour pattern in the weaving (fig. 16).
The challenge was to translate the traditional ikat technique into a studio practice. In course of this working method it was necessary to adapt and modify the used tools and materials in order to be practicable within my workshop setting. For instance I misused a reed rack (rack to organize weaving reeds) to be able to stretch different amounts of yarns to prepare skeins for dyeing (fig. 17).

fig. 17 In order to stretch the weft threads I used a reed rack to preparing the skein (for dyeing bath) by winding the yarn around a rigid rack. one round is equally one colour repeat in the thread.

fig. 18 The tied skeins after being removed from the rack, the tied areas will prevent the dye to penetrate the yarn in this area leaving it undyed.

fig. 19 In the next step the skeins will be dyed with indigo, dried and than untied, pattern is applied on the yarn through resistant dyeing.
Fig. 22  approaching the traditional way of weft ikats in which the weft thread is bound to skeins, the resistant area is tied, and then dyed in an indigo vat. The measures between the blue (indigo dyed) and the white (resistant) in regard of the weaving width will create a difference in the colour pattern.

Fig. 20 variation in the dyeing pattern will create a different pattern in the woven structure.

Fig. 21 wounded bobbins (indigo dyed mercerized cotton) on top of a woven structure.
extraction
focusing on the most characteristic parts with the highest potential for innovation

After gaining a practical and theoretical overview of the ikat process I extracted the individual elements from each other - background and foreground, weft and warp, dyed and undyed area.

I focused on the patterned weft thread as the essential element to build up a woven structure. I extracted the colour pattern from the traditional approached ikats and interpret it in a new way.

The result was a deconstructed ikat that left the warp threads visible and the former motif that was made through the different colours in the threads became the woven area. This step represents the foudation for the final result.

fig. 23 the characteristic disruptive ikat motif as a decorative weave

fig. 24 dyed skeins - the new way of weaving effects the way to dye and needs to be adapted, on the left the skeins how they are dyed so a colour pattern would be created (traditional approach), on the right skeins with white marks which are the foundation of the new way of weaving

fig. 25 plain weave with indigo dyed yarn. The yarn is dyed in the new way. The pattern in the yarn consists of marks which I usually use as an indication of when to turn into the next weaving row or when to switch into a new binding pattern. Here I just used it in a traditional plain weave to show how the new developed dyeing would look in a traditional setting
fig. 26 Abstracting the weaving through the extraction from the traditional approach (above) and utilizing its colour pattern to create a new approach of the ikat process (below)
specialisation
picking one approach and develop it further

The exploration in this stage explores the new approach and tests its limitation and potential. It narrows down the research focus and provides a library of samples which can be used later to decide on the realization of the final results.

This new approach creates an aesthetic expression of a deconstructed or wornthrough cloth. The new concept is based on a system in which the tying (in the stage of yarn preparation) is used to create white marks after resistant dyeing. This marks function as indicators of when to switch into the next weaving row disregarding if the weft thread reaches the selvedge. Depending in which distance the marks are set the allover motif will change. Therefore already on the stage of yarn preparation the motif can be predicted if it will be regular or irregular pattern. If the intervals are repetitive it will create a repetitive pattern if not the motif will be more difficult to predict in the early stage.

This approach presents a new range of possibilities. For example to every interval a certain binding pattern or weaving row can be assigned (fig. 27 – 28). It is possible to come up with a varia-

fig. 27 (detail of the right piece in fig. 29) a deconstructed pattern with clearly visible white marks. Each interval is assigned to a binding pattern and a weaving row. In this sample the sequences (distance between each mark) are not repetitive therefore it creates a irregular motif

fig. 28 each weaving row has one interval of plain weave and one with a decorative weave, the sequences between each marks are calculated in order to create a regular pattern. The repeat for the weaving rule in this sample was: 1 interval twill binding - 1 interval plain weave - turn next weaving row - 1 interval plain weave - 1 interval twill binding
fig. 29 this samples show how to create different motifs - from left to right the degree from regular to irregular increases. Therefore it is possible to predict the motif (the distribution of the woven area) in the stage of yarn preparation.

In consideration for building up the weaving rule it is important to include how the selvedge (traditional turning point for the next weaving row) should affect the weaving. If it will be treated as an automatic switch into the next weaving row or if it will have the same impact as a white mark and will force to switch into the next interval.

The length of the intervals in comparison to the width of the weaving needs to be considered since the width of the weaving has direct impact on the weaving motif.

This new approach offers an unlimited amount of possibilities to create weaving patterns. For the next stage I decided to choose one rule (turn after each interval and every row will build up on one binding pattern) and to test its potential further. It can be seen as a continuing and more specific exploration of the developed method in consideration of the impact on the aesthetic expression.
manipulation

testing the approach under different conditions

The last part of the design process functions as a verification of the developed method and how it can be transformed under different circumstances, for example through different material.

In connection to the final result, the exploration will be limited on the following set of rules:

- main binning pattern: variation of twill (Zig-zag pattern)
- after each dyed mark the thread is turned into the next weaving row
- if the weft reaches the selvedge it will automatically switch into the next weaving row
- choice on regular or irregular motif

These sets of rules are used as a guide for all final pieces and as a base of how the aesthetic expression can be altered through the choice of material, finishing and additional dyeing of the warp.

In this stage the developed approach is tested with a collection of material to enhance different properties of the weave and demonstrates its potential toward its aesthetic expression.

The aesthetical expression can be already predicted in the beginning of the making process through following choices:
- weaving material (for weft and warp)
- weaving width
- a regular or rather irregular motif

fig. 31 preparation for the different warps made from bamboo, cotton and paper bast. each of them has a different thickness

fig. 32 one of the final pieces, bast weave is still stretched on the hand weaving loom
fig. 33 in progress with the weaving, warp and weft is a cotton thread

fig. 34 weaving with a bamboo thread in weft and warp
2.2 DESIGN RATIONALE AND WORKBOOK

During the development process for the design project different criteria influenced the decision making process. Within the analysis of the textile sample the design experiments were compared and judged upon the aim and final presentation of the design project. In regard to the aim the judgment was based on the innovative factor and questioning if the sample show a new and contemporary view of the traditional ikat technique. What has been done before? Is it pushing the development in a new territory or is it following the previous attempts from other practitioners? Is it creating something unexpected when it comes to weaving in general and handweaving specifically?

In regard to the result other criteria additionally become important to make rational decisions. The degree project is supposed to be presented within the context of an exhibition therefore especially towards the end of the design process some decisions were made in regard of this factor: especially when it comes to size of the weaving.
The shape pattern (or motif) is extracted through the process of destilling the motif of traditional ikats from the background. In this process it was important that the shape would resemble the ikat characteristic to show the reference to the original technique. The most important characteristic of the ikat pattern are the fraying edges that result from the displacement of the patterned thread.

In the new ikat approach it is possible to predict the structure of the woven areas before the actual weaving process. The arrangement of the distances between the marks (intervals) affect the overall pattern. It is possible to control the structural pattern through exactness in tying the skeins. To create an irregular and unpredictable pattern, the marks need to be in an irregular way with no repetition of the intervals.

Therefore the motif is already decided upon in the stage of dyeing preparation of the weft thread. Depending how the sequences between each mark are will affect the final result.

Following criterias influence the motif:
A repeat in the dyed weft thread would result in a regular shaped pattern. The longer the repeat in the thread the longer the repeat in the motif.

fig. 35 different approaches to find the right pattern for the motif and an attempt to predict the result. This way of working works only if the size of the intervals will be repetitive which will result in a regular motif. The repeat will create a diagonal line this will turn into a zig-zag pattern after meeting the selvedge. If other rules and measurements will be applied the motif will look differently
material and scale

After developing the new ikat approach it become important to test them towards other design variables. The choice of material was restricted through the resistant dyeing process - only natural or natural based fibres can properly be dyed with indigo (fig.37).

The experiments were conducted to test the concept and see how material and the proportion in thickness between warp and weft would change the aesthetic expression and the textile properties.

For the exploration I chose 3 different qualities for the warp that provide a range of possible thicknesses for the warp at the hand weaving loom:
- thin bamboo (fine)
- cotton yarn (medium)
- papper bast (thick)

I interlaced the warp with a variation of different qualities for the weft. The scale is also chosen in consideration of the technical limitation of the hand weaving loom. There is a restriction in how thick the warp can be to fit through the gaps of the reed.

fig. 36 using a plastic warp with a cotton weft to explore other materials for the warp

fig. 37 different materials are dyed with indigo to see how the fibres absorb the dye. All samples were dyed at the same time and the same duration of the oxidation process. Only natural or natural based fibres such as viscose will offer all spectrums of indigo. In the same time synthetic fibres such as Polyamid will only reach a bright blue.
The examples were judged from the perspective of a weaver, practitioner and also as a non-textile educated viewer. Each of this perspective has a different understanding of traditional and modern textiles. Therefore it was important that each of them would understand that a new and innovative approach in the ikat technique is being used. For this reason I choose not to hide the warp through a weave. I wove a sample before in which I combined 2 different qualities of the weft thread (one thin one for the ‘background’ in plain weave and the other thicker for the structural weave in a decorative pattern) – in this sample only weaver or people familiar with the weaving process could observe the aspect of why it is as advanced and different from the traditional ikat. In this case the advancement and the technical approach would probably get lost to the non-textile educated viewer. Therefore I decided to leave the warp visible, so it would already at the first view be interpreted as new approach on weaving.

fig. 38 in this sample the warp is completely interlaced with a weft thread. This has the effect that a non-textile educated viewer won’t interpreted it as a new take on ikat
The binding pattern brings a new aspect into contemporary ikat. Traditionally most ikats use plain weave to construct the textile cloth in order to enhance the dyed pattern.

In order to create something new I chose to use a decorative pattern, after some experiments I decided upon pointed twill (zig-zag). The advantage of this binding pattern is that it is a very recognizable pattern even after only a few weaving rows. Additionally it offers multiple variations in the binding patterns when the weaving rows meet in a different order.

fig. 39 Especially when the weft thread reaches the selvedge the binding pattern changes in certain areas since different rows are placed on top of each other this creates a constant transformation of the main binding pattern
fig. 40 technical drawings and sketches to visualize the interrelation between repeat of the thread, intervals and binding pattern
finishing

For the finishing I used a glue solution as a textile stiffener to secure the threads within the samples. The stiffener is applied when the fabric is stretched in the loom and holds its shape.

Since the weft and warp are not tightly bound as in the traditional weaving the threads sometime are loosely inlaid in the open structure - therefore the glue is stabilizing the structure. The finishing influences the aesthetic expression.

The stiffen samples are more representing the controlled and regular expression. The woven structure becomes rigid and does not change while the not stiffen samples embody the accidental approach and emphasis the irregular pattern. In the last case the threads might slip or drift apart and get a life of their own.

fig. 41 in the top the sample is stiffen while on the bottom the warp threads are kept in the original state. Only whenever the warp and weft meet a stiffener is used to keep the threads in place
3 CONCLUSION

3.1 RESULT

The results of this design project are 5 pieces. They all present an alternative combination of resistant dyeing, ikat, and hand weaving. This new concept presents a new way of how the woven structure can be already influenced in the stage of yarn preparation. Additionally it provides a proposal of an experimental way to develop a random and irregular weaving pattern on a hand weaving loom.

It also presents one possible outcome or design solution of the design problem where the patterned thread is turned into the next weaving row after each dyeing mark. All 5 pieces are the outcome of this exact weaving way. Their diversity is based through material, finishing and dyeing to achieve a variation of aesthetic expressions. Each of the pieces focuses on one particular aspect of the design process.

The extended exploration within the practice based research resulted into a library of samples. This presents a collection of different dyeing and hand weaving approaches. It provides a variety of samples with various combinations of material, motif, finishing and binding pattern. Each time they form a different aesthetic expression all together.

The final result can be viewed in 2 groups. Piece #1 and #2 present the concept of the regular an irregular motif. They embody the contrast between control and accident and refer to the stage of yarn-preparation where through the tying the motif could be predicted. Furthermore their aesthetic expressions are emphised through the choice of finishing.

Piece #3 to #5 present a manipulation of the developed weaving rule and how it can be extended to the material in order to create the different aesthetic expression. Its motif changes within the piece and shifts from a regular to an irregular pattern.
piece #1 - regular

reed: 60/10
size width and length: 50 cm x 208 cm
material in warp: cotton
material in weft: dyed cotton
scale warp to weft: 1=1
with finishing

The piece consists of a white warp (cotton) and a contrasting indigo dyed weft (mercerized cotton). The resistant dyeing is done in a precise way to create a repeated motif that shows the typical 'blurry' visual characteristics of traditional ikats. Additionally a textile stiffener is used to secure the weft and warp threads to enhance the aesthetic expression of control. The stiffener changes the tactility of the textile structure and it becomes rigid and static.

The main binding pattern is a variation of pointed twill (zig-zag pattern) which transforms as soon the weft thread starts to turn at the selvedge causing a mutation of the main binding pattern. A thin border (plain weave) on both ends of the piece frames the weaving and transmits a neat finish.

The weft thread is dyed with a repetitive pattern in the intervals which create a regular motif. The zig-zag pattern (motif) moves regularly from one selvedge to the other.
piece #2 - irregular

reed: 60/10
size width and length: 50 cm x 189 cm
material in warp: cotton
material in weft: dyed cotton
scale warp to weft: 1=1
without finishing

The second piece shows a contrast to the aesthetic expression of regular motif from the piece #1. In both pieces the same material is used but treated in a different way. In this piece the focus is on the irregular or accidental expression. No textile stiffener is used to keep the typical textile tactility hence it’s possible to achieve a rather fabric-like fluidity when draped.

At the same time the loose interlocking of warp and weft avoids the massive moving of the threads. It shows how the thread would behave when they wouldn’t be hold in place. In the end the warp threads are left longer and are not additionally secured. This implicates an airy and wild expression especially in contrast of piece #1.

The appearance is fragile and brittle which is amplified through the loose interlocking between warp and weft. This makes it some areas difficult to detect the binding pattern which seems to constantly change and shift without repetition.

The motif is irregular in its repeat, which is decided in the stage of the yarn preparation and is achieved through the lack of repetition within the pattern in the dyed yarn.
piece #3 - material

reed: 35/10
size width and length: 55 cm x 240 cm
material in warp: paper bast
material in weft: dyed paper bast
scale warp to weft: 1=1
without finishing

This woven piece is made with paper bast in warp and weft. In the upper part the motif is regular and slowly breaking apart into a more random pattern towards the lower part. Since the bast is wider the resulting binding pattern looks like it consist of small squares.

This piece focus on the effect a different non textile material has on the aesthetic expression. In contrast to piece #1 and #2 the bast weave offers a different appearance. The weaving structure and the binding pattern seem bolder and the focus is directed the choice of material.

The motif starts on the upper part to be regular and develops into an irregular repeat. This is done on purpose to show the variations in the binding pattern and add a different visual pattern in this piece. During the preparation of the weft the marks are placed first in a regular repeat and slowly becoming more irregular.

The warp threads are not additionally secured in the end of the weave. This way they can move freely and it becomes easier to understand the material properties.
piece #4 - delicacy

reed: 35/10
size width and length: 52 cm x 192 cm
material in warp: dyed bamboo thread
(without marks)
material in weft: dyed bamboo thread
scale warp to weft: 1=1
with partly finishing

In this piece the weaving material is a blend between bamboo and mercerized cotton. Both warp and weft is dyed. Additionally the area around the interlacing of the warp and weft is glued and stiffen in order to secure the weave while the remaining area is not stiffened.

The focus in this piece is rather on the resulting aesthetic expression of delicacy. This becomes apparent especially in contrast to piece #3 and #5.

Concerning the motif it starts with a regular pattern on top and slowly transforms into an irregular pattern. The piece ends with a thin woven line to hold all warp threads in place. In this area the original undyed bamboo thread is visible.
piece #5 - weft thread

reed: 35/10
size width and length: 52 cm x 192 cm
material in warp: dyed bamboo thread
(without marks)
material in weft: dyed cotton rope
scale warp to weft: 1>1
without finishing

The final piece used the same material for the warp as the previous piece. The weft consists of a thick rope which stands in a high contrast of scale to the thin warp threads. Therefore automatically the focus is drawn towards the weft material and how the rope winds its way from one side to the other.

The developed technique is most understandable in this piece. The patterned thread is in focus and its white marks are clearly visible and dictate the end of each weaving row.

The motif starts on the upper part to be regular and develops into an irregular repeat. This is done exactly like in the previous pieces #3 and #4. During the preparation of the weft the marks are placed first in a regular repeat and slowly becoming more irregular.

In the end the weaving is secured with a thin weave in plain weave. The end of the rope hangs freely over it and breaks up the rectangular weaving piece.
3.2 PRESENTATION

The choice for the five pieces is based on the intention to show as much variety of the exploration within the degree project as possible. Therefore each of the final pieces show different feature of the way the patterned thread influences the woven structure and creates a different aesthetic expression.

The design components were chosen from the batch of material experiments in regard or the interrelation of the final pieces to each other. The choice of material and dyeing approach (including dyeing the warp) were made to enhance the individual characteristics. All together the final result offers an overview of a new interpretation of the ikat process.

The outcome of the degree project is also developed in consideration of its presentation within the context of an exhibition. All pieces are supposed to be shown next to each other in order to compare them in relation to each other. Therefore it is crucial to have them in similar size and presented in a similar way (hanging).

The context of an exhibition presents a location in which the public can experience them visually in the best way possible. Therefore the textiles are hanged and draped to showcase their textile properties.

Since the pieces are not supposed to be touched it is important that the textiles are hanged in a way that allows seeing them from all angles.
3.3 DISCUSSION AND REFLECTION

This degree work was only possible to accomplish through the use of a hand weaving loom and its technical possibilities - for example the ability to turn the weft thread any moment within the weaving. Therefore the restriction of the developed method is tied to the specific approach on hand weaving and dyeing. In a different technique such as the jacquard machine this process is technically not possible to achieve. Nonetheless this new developed concept could be used as an inspiration and be modified to fit the requirements of other techniques. For example it could be applied in kitting.

The contribution to the field is a design process which embraces the unpredictability in the weaving process to create irregular pattern. It questions the essence of traditional craft by demonstrating a new aesthetic take on a traditional technique through the combination of hand weaving and indigo dyeing.

The degree work shows also the technique of hand weaving as an experimental way of sketching. In the next stage the artwork always can be translated into an industrial setting. At the same time hand weaving offers a great way to work directly with the material and threads.

The result shows an experimental way to explore and create new aesthetic expression. Therefore the project presents a successful reinterpretation of the ikat process. In comparison to the existing samples from the field presents my degree work a new and experimental contribution to the topic of traditional textile processes.

On one hand there are artists like Wendy Weiss and Mary Restieaux who revived the traditional ikat technique through the use of different motifs. They use elements such as phrases, poems or play with patterns that remind of Bauhaus design.

They utilize the ikat process to primary highlight their motifs and patterns. Their work differs from the traditional ikat only in their choice of motif. While on the other hand Åsa Pärson starts from the ikat technique and strip it down to its basic elements before she carefully adds foreign binding structures on top. Her pieces speak a raw language and in the process of making remain the fundamental approach of primary dyeing and subsequently weaving.

In comparision to Pärson’s work my pieces start from a more complex level. I follow her way of working in a more detailed variation by adding little by little more elements in my work. Her work has a refined level of simplicity while my work embraces different embellishments.

This degree project has more similarities with the work of David McCallum and the ‘ikat printer’ from Rodriguez and Wagner. Their projects draw a comparison between weaving and the binary coding of computer programs. Each crossing of weft and warp can be translated into a 1 or 0 in binary code. Especially McCallums work ‘power of satin’ reminds of a software program. Here some parallels can be found in my work where I used a patterned thread that every time it reaches a white mark gives the signal to turn into the next weaving row and creating its own coding in the way of weaving.

All in all my work uses the foundation the other practitioner created and pushes the envelope even further. This degree work steps up and presents something innovative that hasn’t existed before when it comes to ikat textiles. It developed further than the level of motif choice like Wendy Weiss or on the level of altering the technical process such as in the work of Pärson. At the same time it progresses beyond its positioning within crafts by following a programming way of weaving and on top questions the traditional weaving and the constant interlocking of weft and warp.
4 REFERENCE


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fig. 1 Gösta Sandberg collection at the Museum of World Culture, Gothenburg
[accessed at 2015-02-26]

fig. 2 Honolulu Academy of Arts, ritual heirloom cloth from Gujarat in India
https://upload.wikimedia.org/wikipedia/commons/a/a7/%27Patola%27_%28ritual_heirloom_cloth%29_from_Gujarat%2C_India%2C_late_18th_or_early_19th_century.jpg
[accessed at 2016-09-13]

fig. 3, 4 Gösta Sandberg collection at the Museum of World Culture, Gothenburg
[accessed at 2015-02-26]

fig. 9 Wendy Weiss (2010), Blood on My Hands
https://wendyweissdotorg.files.wordpress.com/2012/06/blood-on-my-hands-detail-h1.jpg [accessed at 2016-09-13]

fig. 10 Mary Restieaux (1990), Ikat weaving
http://www.culture24.org.uk/asset_arena/3/01/10/401103/v0_master.jpg [accessed at 2016-09-13]

fig. 11 Ethiel Stein (1980-89), #5
http://www.cooperhewitt.org/2013/02/17/studied-beauty-textile-panel-by-ethel-stein/ [accessed at 2016-09-13]

fig. 12 Gennie Stafford (2010), Napkin 1

fig. 13 Åsa Pärson (2014), Fältanteckningar

fig. 14 Diaz Rodriguez, Sara; Wagner, Ursula (2012), Ikat printer

fig. 15 David McCallum (2011), Power of Satin
http://www.sintheta.org/projects/powers%20of%20satin.html [accessed at 2016-09-13]