Bamboo weave patterns

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Guide
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The Industrial design Special project

Bamboo weave patterns

by

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0 1 6 1 3 0 0 2

is approved for the partial fulfillment of the requirements for the postgraduate degree of

Master of Design in Industrial Design

at

Industrial Design Centre,
Indian Institute of Technology, Bombay

Guide.....

Internal examiner.....

Acknowledgement

I would like to acknowledge my project guide Prof. A. G. Rao for his timely guidance to complete this project.

I would also like to thank all the members working in bamboo studio, especially Ms. Gangamma for their help and assistance.

Abstract

Bamboo products have a long history all across the world, specifically in China, Japan and India. In all these places, there are various traditional bamboo weaving patterns, which have been developed through ages. There are certain patterns, which are common in every region, though these are known by different names in that particular region. However, some interesting weave patterns are developed in that particular region only and thus these become the specialty of that region. It's interesting to observe the method or process of weaving these fascinating patterns, which might be different for the same pattern in two different regions.

These weaving patterns, which are in two-dimensional forms, are used to make mats, fans, partitions, screens etc. For three-dimensional objects like baskets, vase, fish traps etc. same two dimensional weave patterns are adopted and then converted accordingly.

This project makes an attempt to analyze the grammar of existing weaving patterns, and classify them into categories. Through this classification, the gaps and be identifies which can lead to develop the methodology to come up with new patterns.

Contents

1. Introduction

Bamboo weaving is an art. This craft has developed and reached its excellence over a period of time, through the influence of social and cultural factors. Material properties play an important role in the variations, which have come up. Every craftsperson has developed his/her own style and variation in bamboo weaving, thus giving rise to different patterns of weaves. All over the world, there are hundreds of such patterns available. There are some existing names for the weaves which can be traced in history. But these vary according to the region. The names are given by the name of the craftsperson, or place where it is practiced or its resemblance with some real life objects like flowers, sun etc. But all existing patterns cannot be classified under such names or terminology. However, to date, there is no universal classification for the weave patterns. The basic elements leading to the variations in the patterns, which can be used for the classification, are not yet identified.

The aim of the present project is to come up with an analytical method for classifying these weave patterns. So that, using the same method all the existing patterns can be categorized under some category. This classification will help in identifying the basic differences in basic weave patterns.

Once the methodology of the basic weave structure is known, generating new patterns will become easy. Playing with the fundamental elements of this structure, one can get many combinations and thus different patterns. How to generate such new patterns is also one of the aims of this research.The weaving process itself is very interesting. Those who want to learn the weaving process, learn it from the master craftsperson. However, for some people learning these patterns is a part of the family tradition. All their earlier generations have been involved in weavings, and thus to continue with the family heritage, it becomes imperative for them to learn and continue with the weavings.

However, much depends on the master craftsperson, because the learner can learn and practice only the weaves known to the master. He/ she is dependent on the master's knowledge, which may consist of numerous variations. Generally the master teaches the patterns which are being practiced in that particular region for ages. Even for the method of weaving, which may differ from region to region for a same pattern, the new learner can learn only the method known to the master. There is no universal notification or coding of these weaves available, which can be used to learn new patterns. One of the goals of this project is to come up with some such aid, which can be used by craftsperson to teach learners the weaving process. Such a document can be used by anyone irrespective of the region, and yet help in making the person understand the weave, so that the person is able to weave accordingly.

Objectives

1. To know the fundamental grammar of the weaving structure.
2. To come up with analytical classification of all existing patterns.
3. To study the visual effect of various elements in a weave pattern.
4. To find out methods to generate new variations in weaving patterns.
5. To come up with an aid to teach and learn the weaving process.

2. Scope

There is not much work done in this direction before, and so this project may be seen as a sort of a starting point. To start with the process, this project deals only with the two dimensional weave patterns. As mentioned earlier, the weaves, which are used in the three-dimensional objects, are adopted from the basic two-dimensional weaves, but these weaves become complicated. Thus, initially the classification is to be developed for two-dimensional weaves only. However, this research can be a seen as a base for further work.

The project is broadly divided in two parts. First part deals with the classification of the weave patterns, while the second part is dealing with the designing of the aid to teach and learn the weaving process.

3. Methodology

2.1 For ‘Classification of weaves’

1. Studying existing weave patterns in two-dimensional and three-dimensional objects.
2. Identifying basic elements in the weave structure.
3. Classifying these existing patterns.
4. Understanding and analyzing the effect of these elements on overall structure.
5. Understanding how the variations in basic elements contribute so as to generate newer variation in patterns.
6. Developing ways to generate new variations.

2.2 For ‘Aid to teach and learn weaving process’

1. Learning the actual weaving process.
2. Decoding the existing weave patterns.
3. Observing beginners and how they learn.
4. Observing teachers and how they make beginners understand what exactly has to be done.
5. Analyzing the problems faced in teaching and learning.
6. Developing ideas for products.

3. Classification of weaves

3.1 Existing weave patterns

This was studied to get an overall idea of the whole gamut of bamboo woven articles and to study the existing terminologies. Countries where bamboo articles are traditionally available are Bangladesh, China, India, Indonesia, Japan, Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, Africa.

The woven articles of daily use are baskets, plates, trays, dishes, bottles, jars, boxes, mats, curtains, fans. Other objects like umbrellas, headgears and garments are woven from bamboo splits. In construction also mats are used for walls, partitions, fences, gates. Bamboo bridges also have woven elements.

3.2 The raw material for weaving

The culm of bamboo is hard, tough and flexible, but it is easy to cut into strips for weaving. The substance and grain of bamboo culms make it easy to split them into narrow strips with simple tools.

The species used for weaving have very flat nodes and great internodal length, with fine and strong tissue.

Through cutting, node removing, Sectoring, splitting and other operations bamboo strips and threads are produced. The strips and threads are the basic materials for weaving various bamboo crafts.

3.3 What is a weave structure?

In most of the weaves two or more sets of elements called the warp and weft (by analogy with textile weaving), interrelate to form a membrane like mat. However, unlike in textile the individual elements never merge to become transformed, but while retaining their identities they create a new pattern.

Weaving as a series of steps repeated over and over is an appropriate medium for repeated pattern motives. While plaiting, the warps and wefts are made to interact in various ways. This has given rise to a large variety of patterns in weaves.

3.4 Classification

The classification of bamboo weave patterns is very interesting. On first sight all these patterns looks very confusing or looks even similar. For the ease of understanding these can be classified on four levels.

1. On the first level these can be classified broadly in some categories, according to the direction in which the strips are running.

2. The next level further classifies variations in a single category. In each category, there is still enormous possibility for different patterns, depending on basic module which is repeated. This module is governed by the arrangement of how many wefts under or over the warps in each row of the weave.

3. The third level classification deals with the possible variations in a single pattern. In this single pattern where the decoding of rows as per the warps and wefts (under and over) arrangement remains same, still lot more variations are possible. These variations are because of the variations in the basic properties of strips (warps and wefts) like width, thickness colour etc. And the appearance of the same weave also changes when the weaving method is changed like plaiting, stitching, laying, inserting, winding stringing and pining.

3.5 First level classification

As mentioned earlier this is according to the direction in which the bamboo strips (warps and wefts) are running.

1. Horizontal and vertical
2. Inclined
3. Inclined and horizontal/vertical
4. Inclined, horizontal and vertical
5. Circular / Central
6. Irregular.

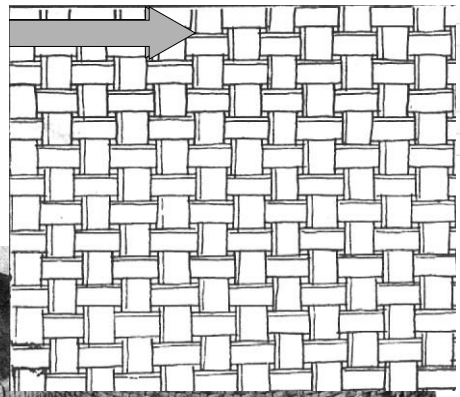
Horizontal and vertical category

Vertical elements

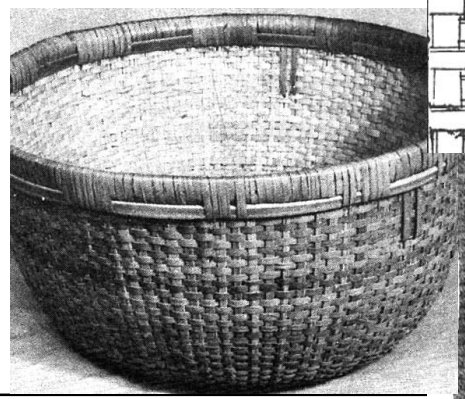
Horizontal elements

These are few examples of the products available in which the basic weave is from ‘Horizontal and vertical’ category.

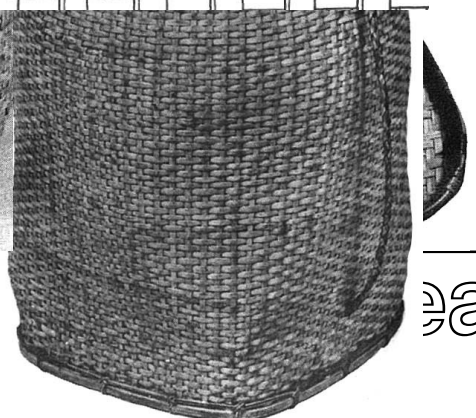
Wall hanging from China



General purpose closed weave basket, Ao tribals Nagaland. The body of the basket have this weave, while the lid has ‘inclined category’ weave.



A basket from Kerala



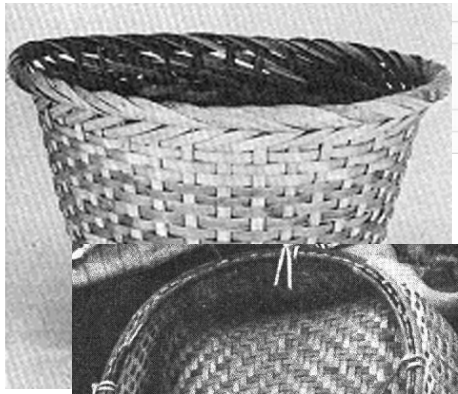
Rice winnowing tray

‘Horizontal and vertical’ category

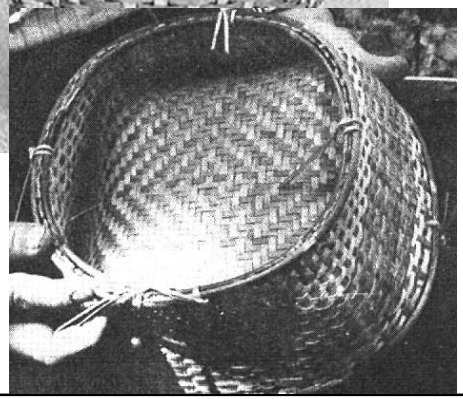
Animal potfrom China

The Dalla- circular winnowing tray from Assam

A winnowing fan from Gohpur in Assam



Khora – Angami Nagas,
Closed weave, carrying basket



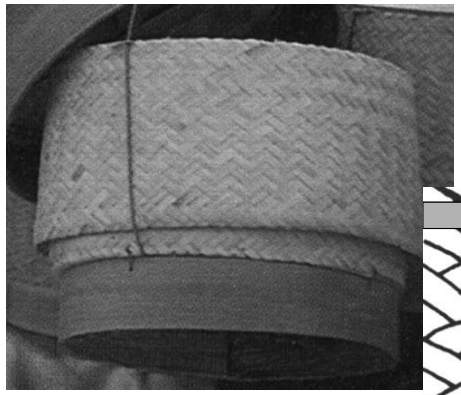
General purpose basket

Double layered basket from Sikkim.

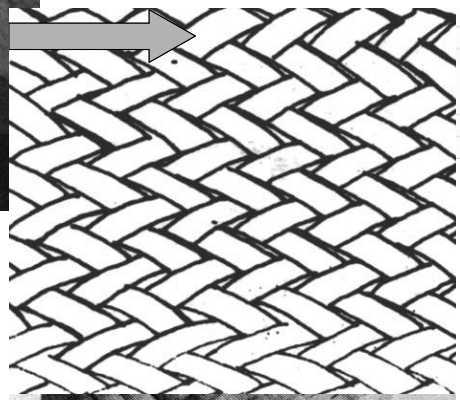
‘Inclined’ category

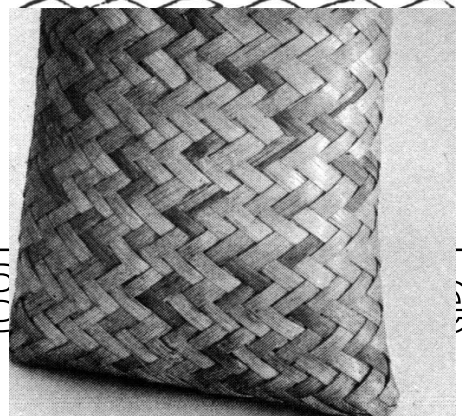
Inclined elements

Weaving pattern on a basket



Thai lunch boxes





Khaloi, a shallow basket form Assam.

A basket from Nalchar, used to store dates

‘Inclined’ category

Japanese basket by Katsushiro

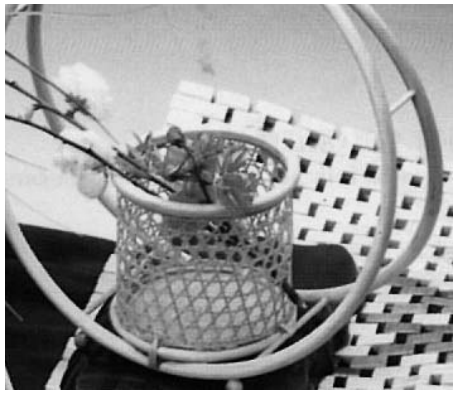
Japanese basket by Fujitsuka

Fishnet basket pattern by Azuma Chikuensai, Japan(1969)

Din, a Nocte basket

‘Inclined and Horizontal /vertical’ category

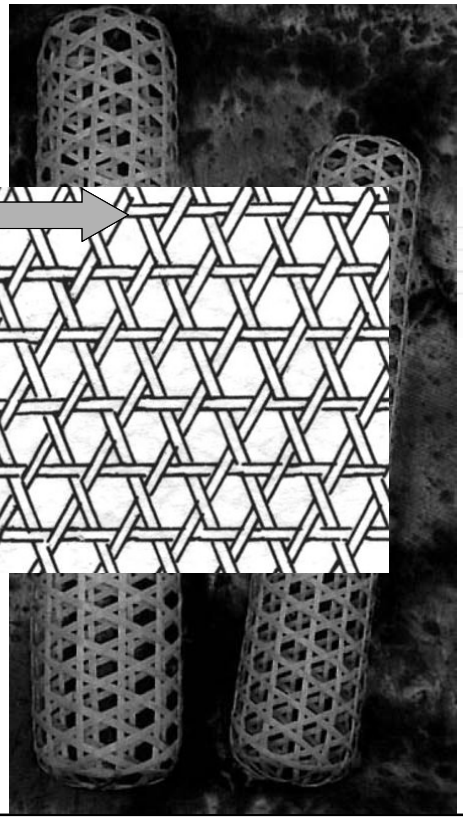
Inclined elements



Flower basket from China

Horizontal elements

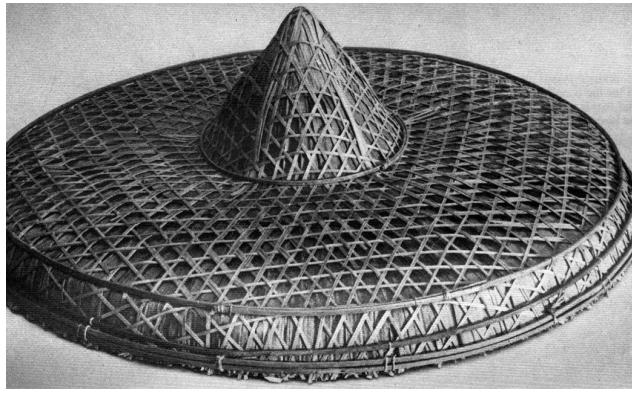
box from China, Colourscheme of the elements used in such a way to give three dimensional effect in flat surface.



3 layerd hat worn by Lepchas of Sikkim

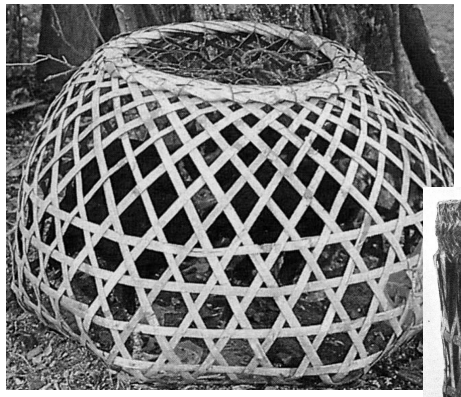
Article for cooling on bed

‘Inclined and Horizontal /vertical’ category

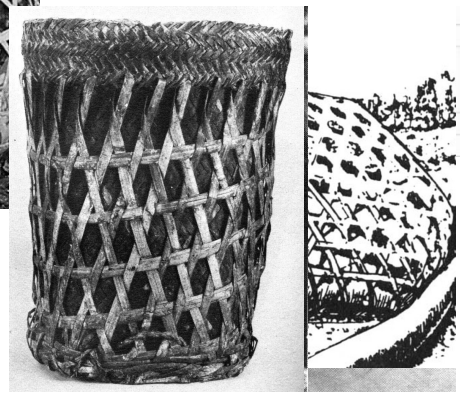


Jhappi, Rain shield, Assam

The sherdukpen grain basket by Sherdukpen tribe of Arunachal Pradesh



Open weave baskets for transporting cocks

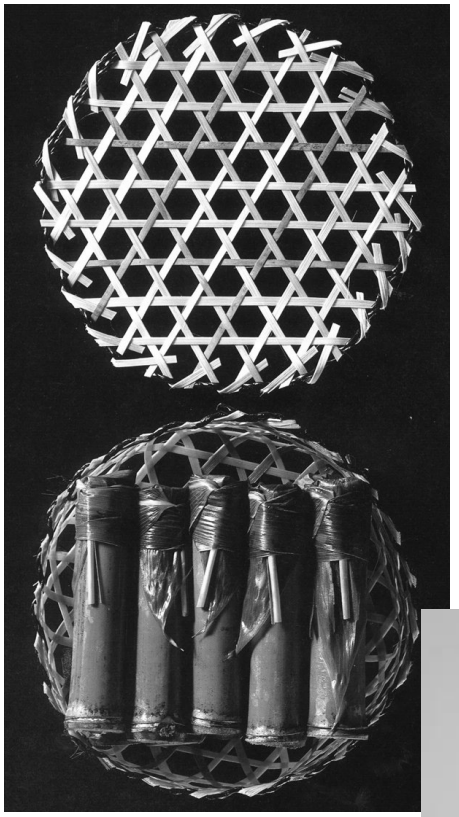


Gabions, an early and surviving mainstay of Chinese civil engineering,
Filled with rocks used to stabilize riverbanks and waterfronts

Basket from Karnataka

Cattle muzzles from tripura

Bamboo plate to keep bamboo tube candy



Fishing baskets

Japanese basket from
Meiji Period (1868 - 1912)

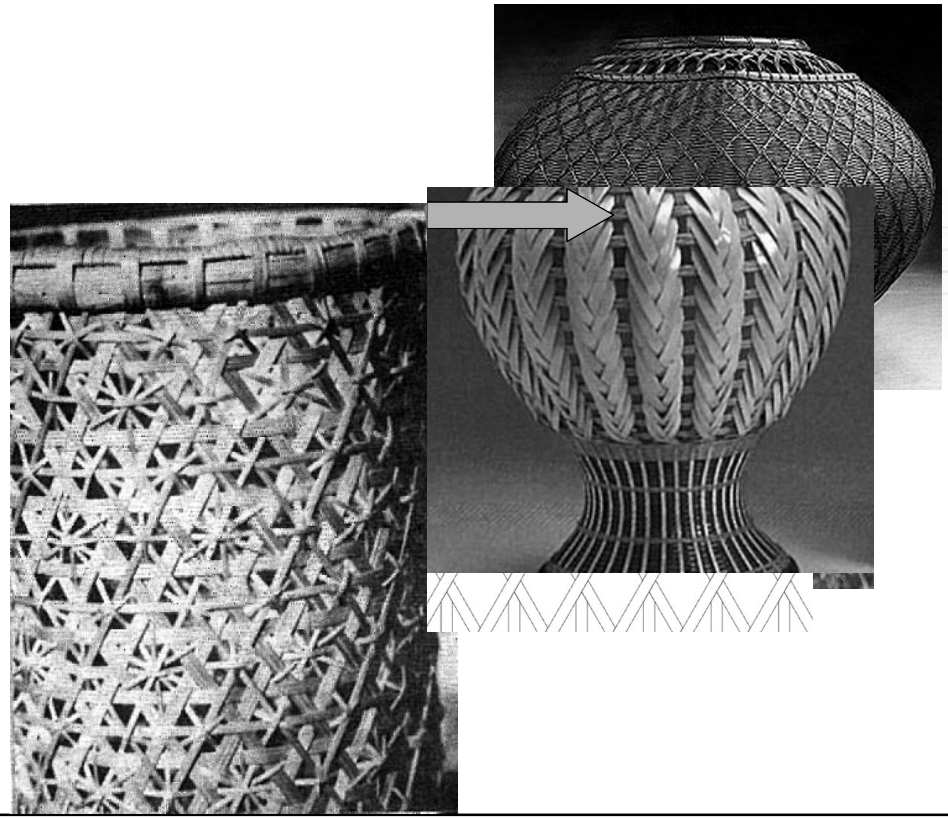
‘Inclined, Horizontal and vertical’ category

Inclined elements

Horizontal elements

Vertical elements

A basket carried on back, from China



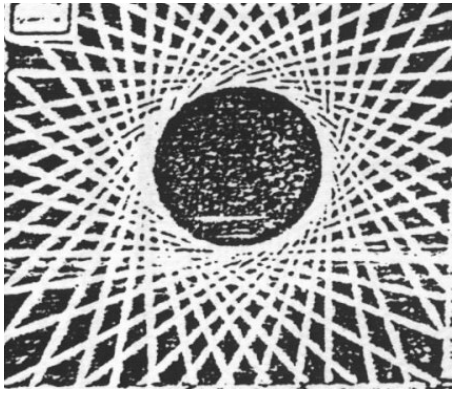
Japanese basket from, Kajiwarakoho

Elaboration of hexagonal/ star shaped weave (Decorative container from bengal)

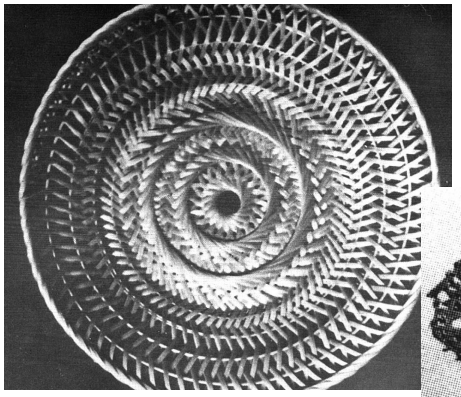
Vase fron China

‘Circular /central’ category

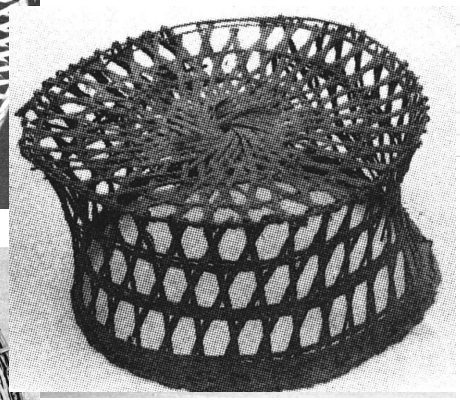
Elements arrangend in circular fashion, radiating from a centre



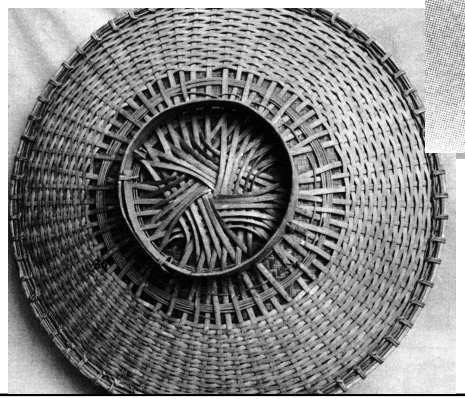
Shamuk, Andro bamboo basket used as a container basket



Bamboo tray

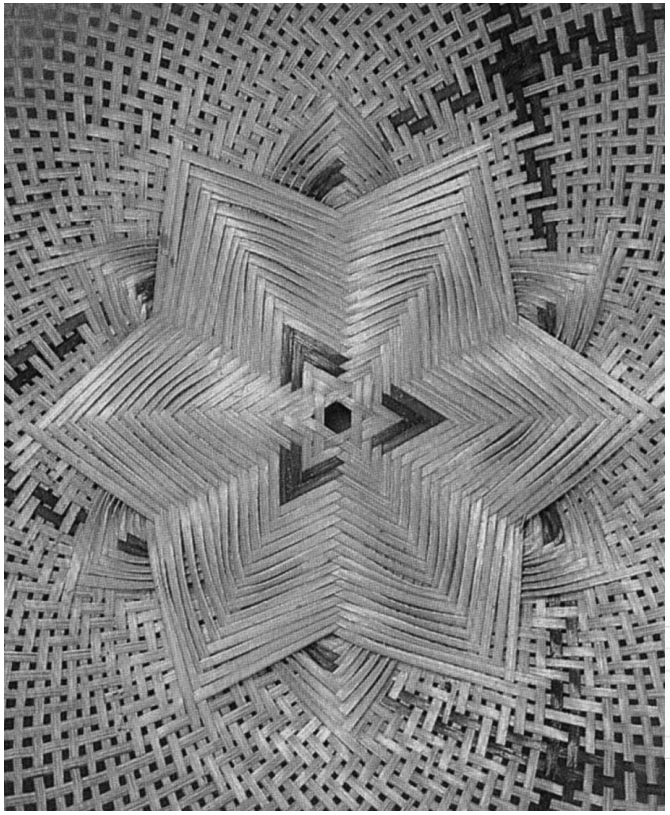


group of warp strands bound together tightly at the base radiates t be crossed with weft strands, Kerala

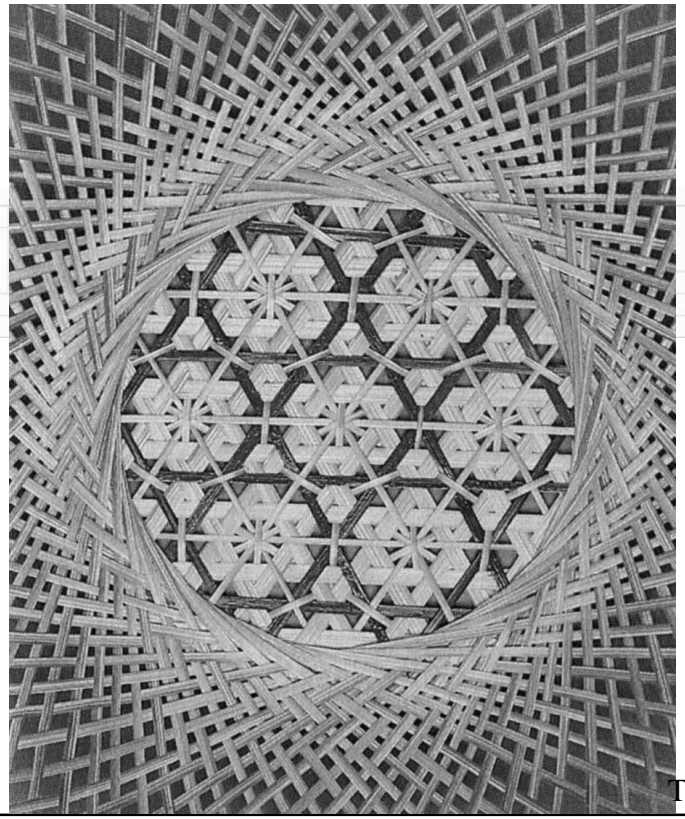


Irang, Monsang basket used for spreading and cleaning steamed rice.

Cap from China



Thai weaving style

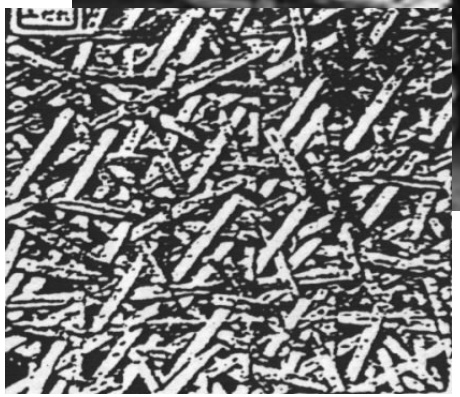


Thai weaving styl

‘Irregular’ category

Elements arrangend in irregular fashion to form a weaving pattern

Japanese basket by Shokansei



Japanese basket

Japanese basket from Meiji Period (1868 - 1912)

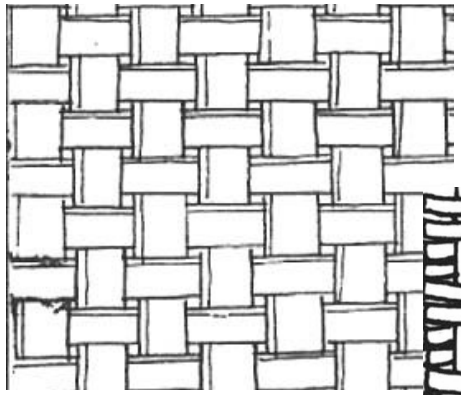
Work by toriiippo

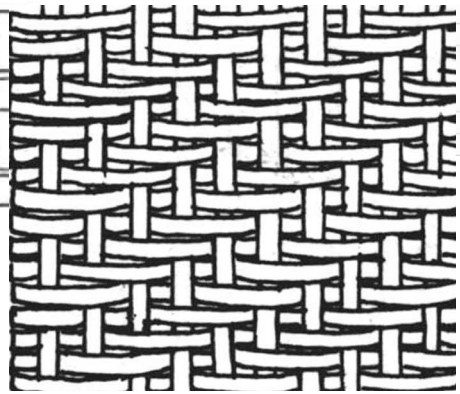
3.5 Second level classification

This is a classification for a single category. This is based on the mathematics of the warps and wefts. How many wefts are going up and how many under the weft plays an important role to define the basic module in a pattern. This basic module is then repeated throughout. The repetition can be simple or it may follow mirror symmetry, rotational symmetry.
The weaves are classified, according to the decoding of the warp and weft arrangement.

3.5.1 Equal Up-Down

In this type, the weft passes over and under same number of warps. This weave gives a uniform texture to the pattern.
E.g. When warp and weft pass over each other singly (i.e. one over and one under) to form a checker board pattern, this weave is known as simple check weave.





A variation of this weave is twill weave, when each weft passes over two warps and then under two. Since the warp and the weft in such a weaves are indistinguishable by size, rigidity or direction both set of elements may be called as wefts.

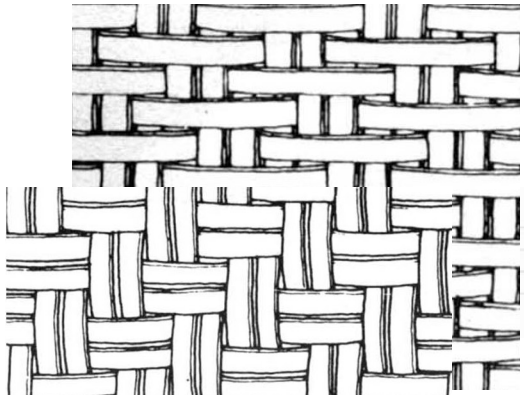
2 Up- 2down
Each weft pasing over three warps and then under three.

3 Up- 3down
Each weft pasing over three warps and then under three.

3.5.2 Nonuniform Up-Down

In this type,the number of warps, a weft passes over and under is not equal, It is changing. And same equation is repeated all over. This weave results in non uniform texture.

4 Up- 1down
Each weft pasing over four warps and then under one.



3 Up- 2 down
Each weft pasing over three warps and then under two.

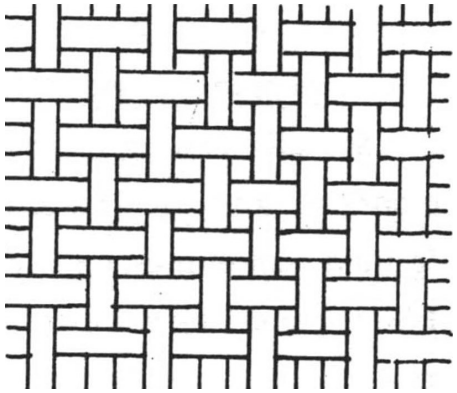
5 Up- 2 down
Each weft pasing over five warps and then under two.

3 Up- 2 down
Each weft pasing over three warps and then under two.

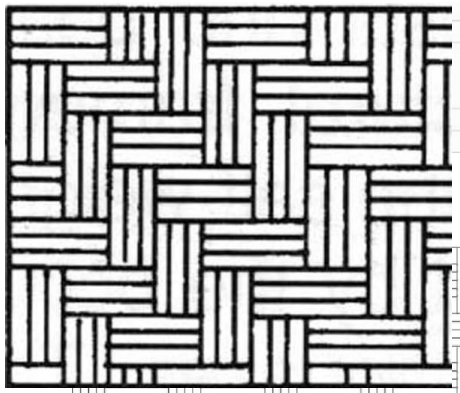
3 Up- 2 down- 3 up- 4 down

3.5.3 More than one strips as a weft or warp

Here, more than one strip is used as a weft or warp. Thus, though the equation of warp and wefts is similar the resulting mat gives a different appearance.

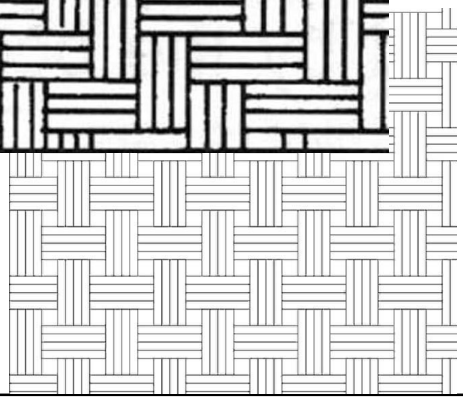


Below are the variations of this same weave pattern with varied number of strips as weft and warps. Though the weave is similar, the effect is very different.



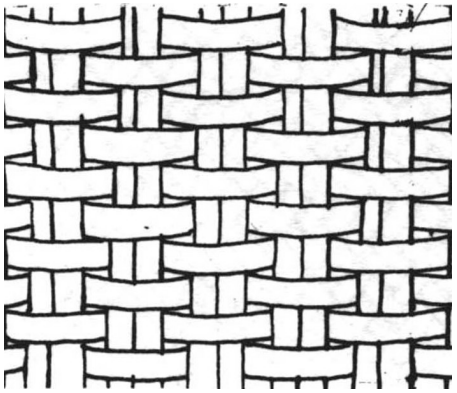
Two strips as a weft and warp,
Mat used in wall construction.

Two strips as a weft and warp

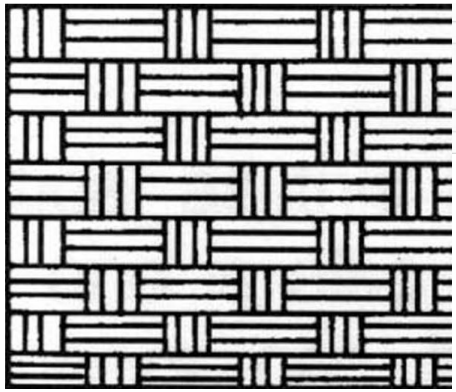


Three strips as a weft and warp,
Mat used in wall construction.

Four strips as a weft and warp



Two strips as a warp

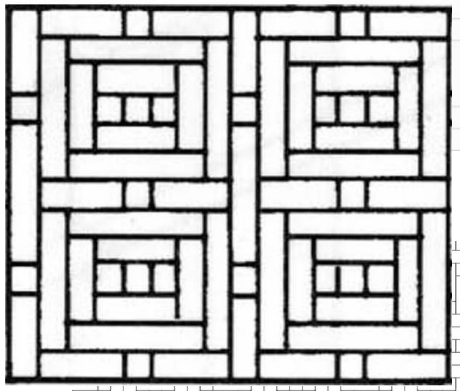


Two strips as a warp

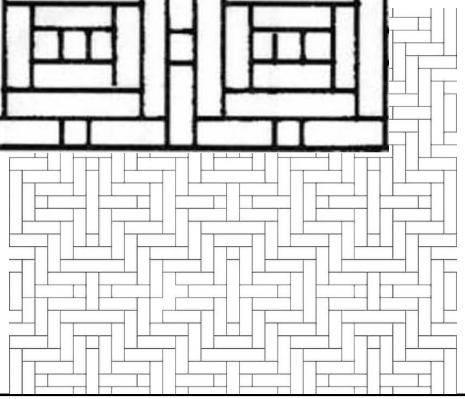
Three strips as a weft and warp,
Mat used in wall construction.

3.5.4 Continuous repetition of basic module

In this type, there is a typical basic module which is achieved by specific arrangement of warp and wefts. This module is then continuously repeated throughout the weave pattern.



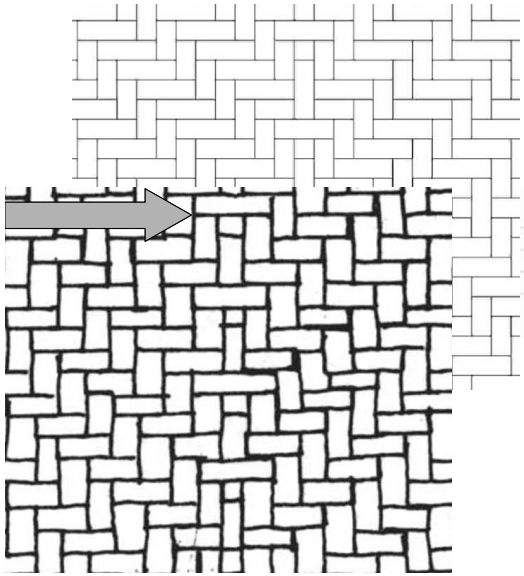
Typical weave pattern used for walls.



Typical weave pattern used for walls.

3.5.5 Central pattern for overall mat

Instead of continuous repetition of a basic module, here some strategy is followed to get a centralised pattern for overall mat. The strategies used can be mirror symmetry, staggered symmetry, rotational symmetry.



Basic half, which is mirrored.

Mirror symmetry followed to get the pattern

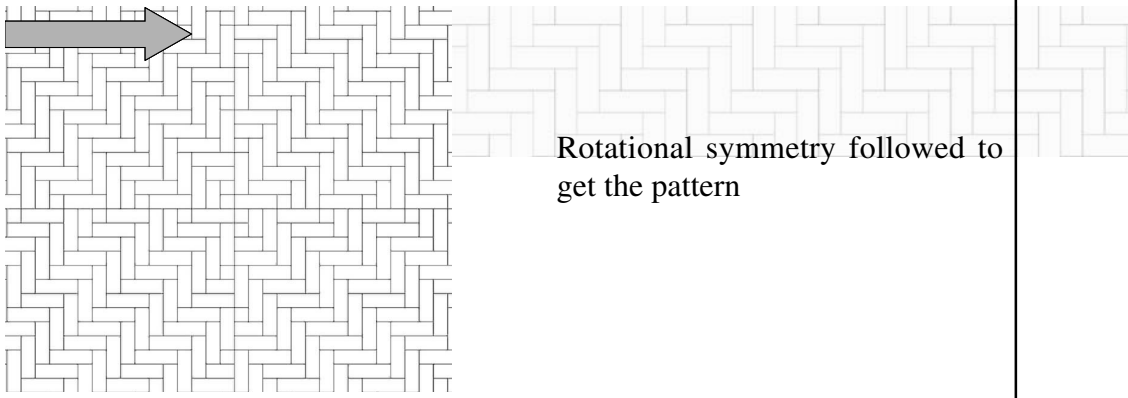
Basic half, which is mirrored.

Mirror symmetry followed to get the pattern

Two halves, staggered

Staggered symmetry followed to get the pattern

Basic half, which is ratated in 180 degrees on the other half.



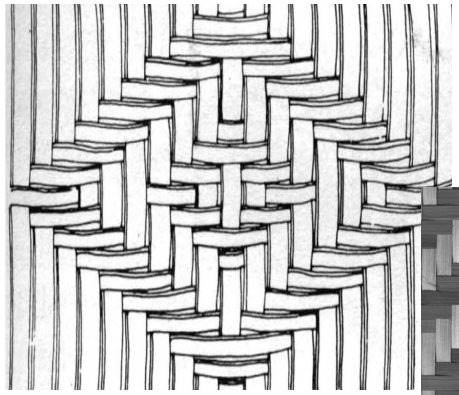
Rotational symmetry followed to get the pattern

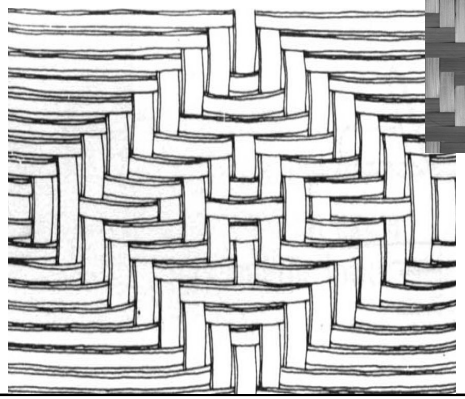
Basic half, which is ratated in 180 degrees on the other half.

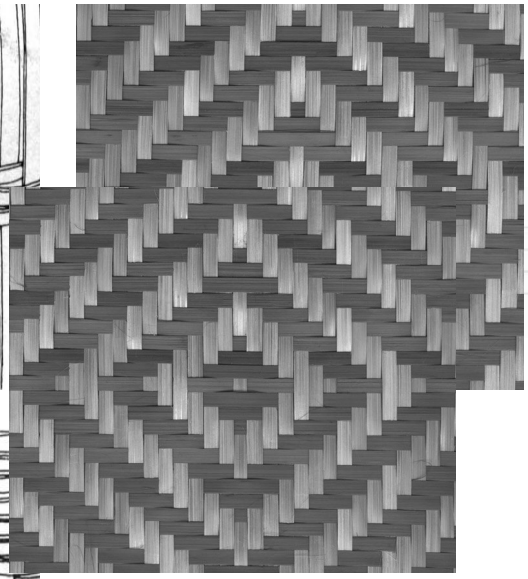
Rotational symmetry followed to get the pattern

If some other strategy is used for repetition than simple continuous repetition, then Front side and back side of mat is different in appearance. This again adds to the variety in patterns even in a single product.

Limitation in weaving process-
Depending on the properties of strips used for weaving there is a limitation on the length of uncrossed strip. E.g. generally the strip should not be without crossing for a length more than 5 times the width of the strip. This is for the self standing weave (One which is not going to rest on any base or support). Otherwise the weave becomes loose.







3.6 Third level classification

This is still deeper level classification into a single weave pattern. It is really amazing to see the potential of bamboo. Without application of any other material or process through the basic weaving structure, pattern one can explore and find so much variety in terms of texture, visual quality.

In this third level, the pattern's basic decoding or arrangement is same. But The variation is through the properties of the strips. The basic factors which are identified for further classification are

1. Type of strips
2. Thickness of strips
3. Width of the strips
4. Gaps between strips
5. Colour of the strips
6. Method of weaving

3.6.1 Type of strips

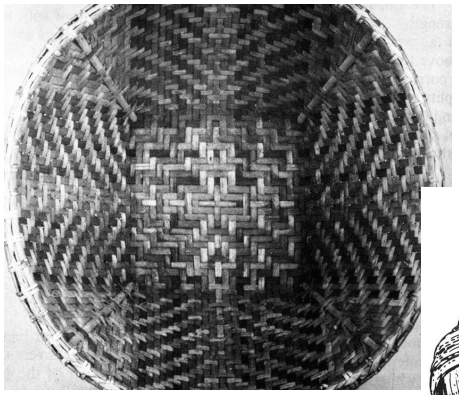
The strips used for the weaving process can change the look though the basic pattern is same.
Following are some types of the bamboo strips.
Hard outer skin of the splits is removed. These splits are known as 'Payas'. These are directly utilised for making baskets in the close weave pattern. These baskets are usually spongy in nature.
Besides the 'paya' there is another variety of fine bamboo split known as 'Kanam paya'. Here the outer skin is not removed. The 'kanam paya' is used in making varied baskets woven in the pattern of diagonals filled into the texture of the open hexagonal weave. Baskets woven with kanam paya are usually stiff and strong.
Small 'Panjengs' or fine bamboo sticks are chopped off vertically and are used in making fish traps.
Split pieces are scraped to make them cylindrical and are then used in making the traps. These cylindrical pieces are called as 'Lushit'.

Detail of side wall and floor of walkway, of a bridge.
Strips of various types are used for wall and floor.

Type of strips

These are the various types of strips used for different applications.

Bamboo ball



Shang- Storage and shop display basket, Jaintia tribe from Meghalaya.

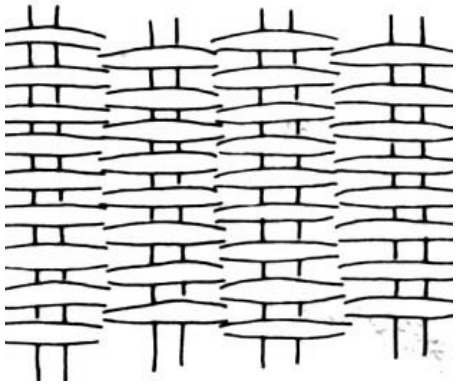
Porcelain bodied coffee set

Slippers

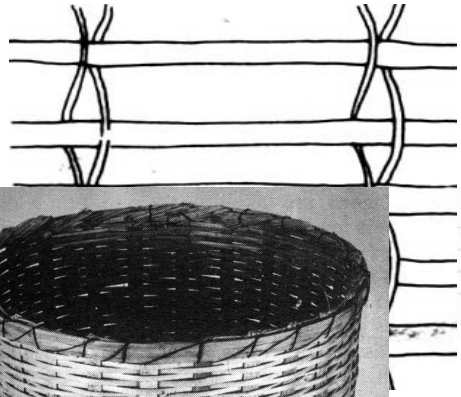
Extremely thin strips are used to weave this screen, and silk weaving skills are applied. The strips are only .002 cm thick.

Type of strips

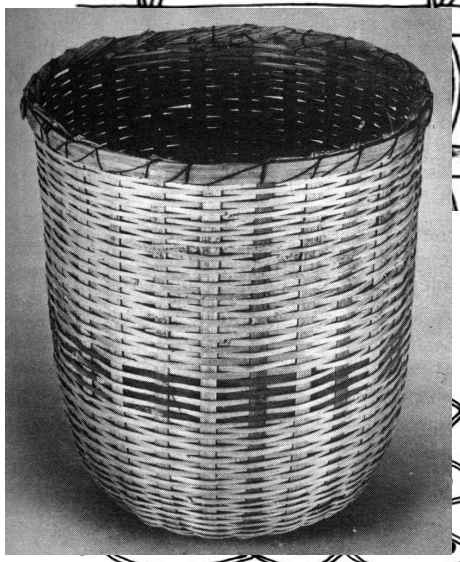
The crosssection of the strips used can also be different. Generally the srips are rectangular in the crosssection. But for some weavings it is circular also. For the strips with outer skin, in crosssection the edges are slightly curved.



Weaving style used for walls



Weaving style used for walls



Tea basket – Assam
Tea picking basket
Coarse bamboo slpits.

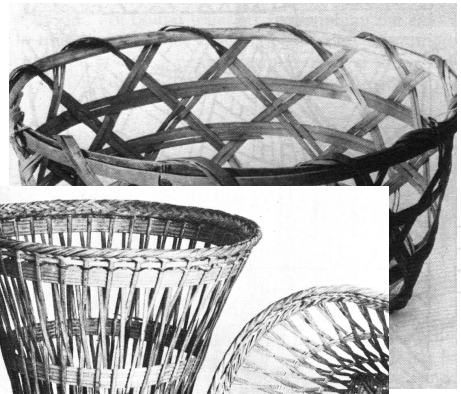
Crosssection of weaving style used for walls

3.6.2 Thickness of strips

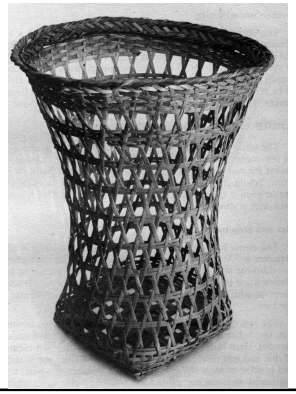
Thickness of the strips is very important criteria to decide the weave pattern. In traditional products all over, lots of variation is seen in the thickness of strips. Thicker the strips, stiffer becomes the mat for weaving. And thinner the weaves one needs skills to weave.
Traditional Chinese bamboo baskets are of very fine workmanship, sometimes as many as 120 thin threads can be woven in a width of 3mm.The weaving techniques reached a high level, within a width of 30 cm masters arrange some 1000 fine bamboo threads.
For mats 10 to 30 threads can be arranged in a width of 3 mm.

The thickness of strips changes according to the product. But one can see the variation of the thickness within a single type of product .
E.g.There are two types of woven bamboo fans, rougher and thinner. Rougher ones are made of bamboo strips and thinner ones from bamb threads.

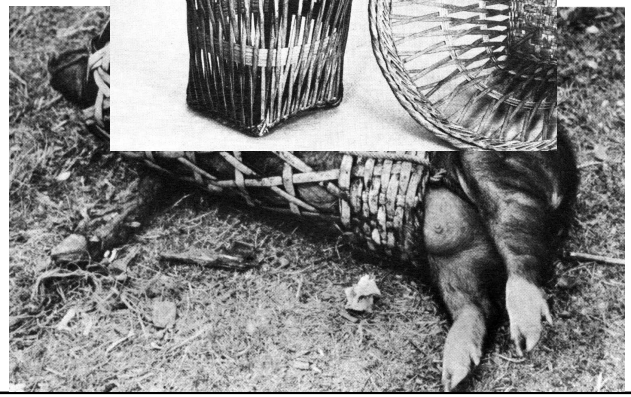
'Paikawng' – Made by Lushai tribe Mizoram, rough work basket.
Bamboo elements – 7mm wide, 3mm thick



Grass basket from Assam-
Pairs of split bamboo
Base each 12 mm wide and 1.5 mm thk, horizontal element 15mm wide, 2.5 mm thk

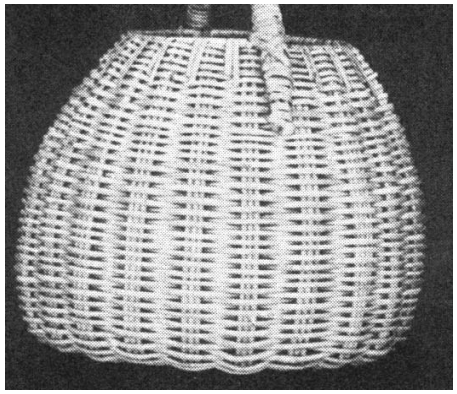


Jamatia Firewood basket. – Jamatia tribe of Tripura., carrying firewood
7mm wide, 1.5mm thick



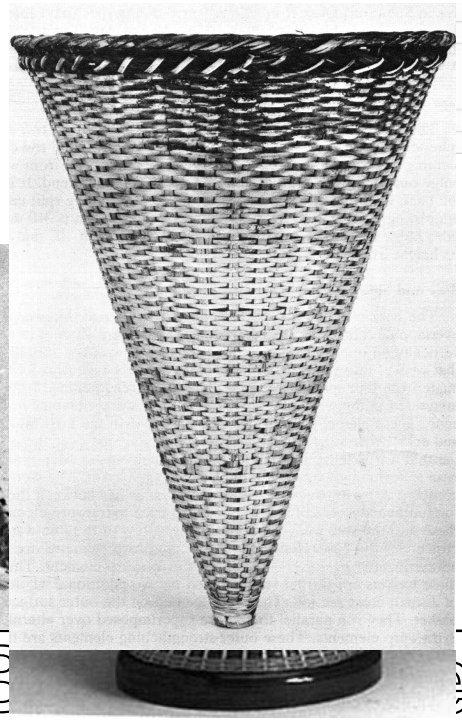
Khasi Pig basket- , Khasi hills, Meghalaya, Carrying pigs.
Outer splits of bamboo. 10 mm wide, 1mm thk

Thickness of strips

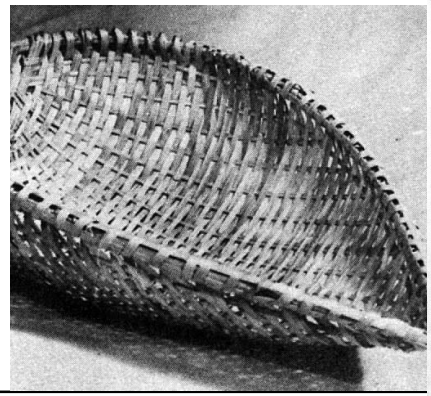


Basket, variation in the thickness of warps and wefts

Vase



Khoh- Khasi tribe , Meghalaya., general purpose marketing.
Bamboo outer splits, fairly thick
Weft half the width and thickness of the warp element.
In weft outer layer of bamboo faces the outer surface of the basket.



Basket from Kerala to scoop ans serve Rice

3.6.3 Width of strips

The width of the elements determines the appearance of the weave.
Narrow strips create tighter weaves and have a delicate fragile effect.
While wider strips give a rough look.

Pot

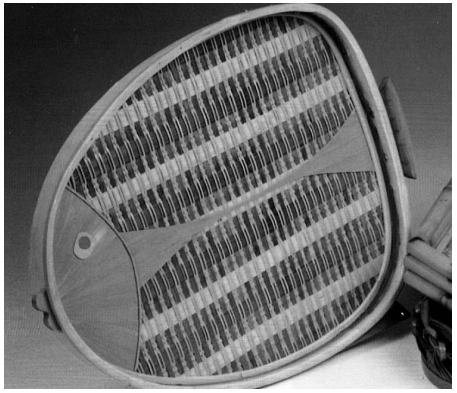
‘Thungol’ - Fish Basket

Ladle from Kerala to serve rice

‘Thumok’ - Manipur.

Small flower basket

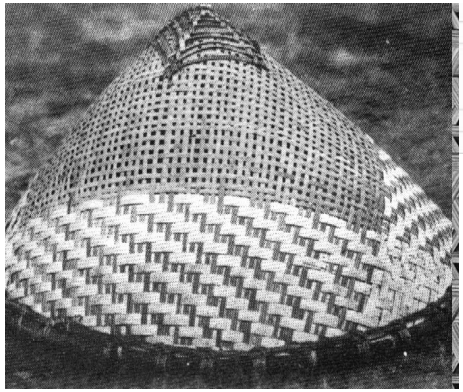
Width of the strips



Fruit tray

Vase

Plates



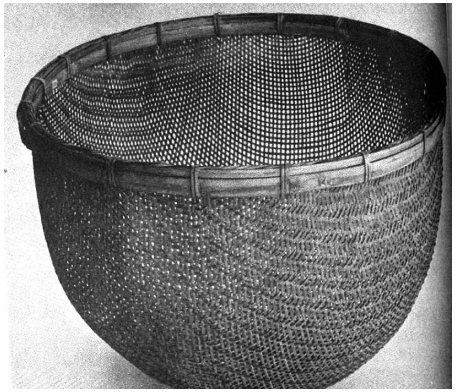
Thai weaving style

Thai weaving style

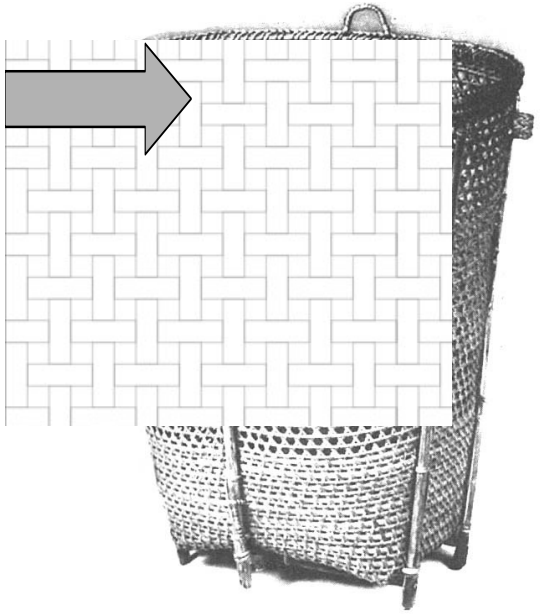
A conical strainer used by Dimasa Cacharis.

3.6.4 Gaps between strips

In the woven baskets, generally there are two types. One is open weave baskets and the other is closed weave baskets. These types are derived from the weave pattern used for the weaving. If the pattern is with the gaps in between the warp and wefts, it is called as ‘open weave’. This Gap or Space becomes important element in the weaving classification. The pattern with gaps added in it, looks very different from the basic weave. Playing with these gaps can result into lot more variations of the patterns.



‘Long’ - Fish trap used in shallow water,
2up -2down weave with gap is used here



Throng-general purpose basket, Nagaland.

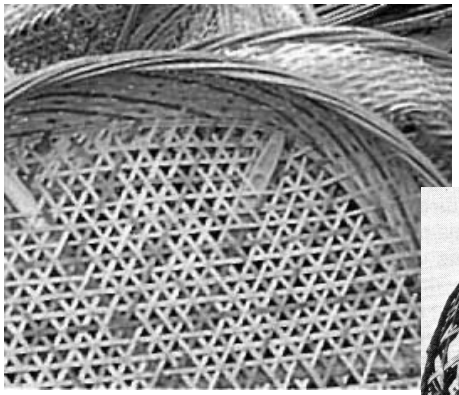
1 up-1down weave

1 up-1down weave with gap

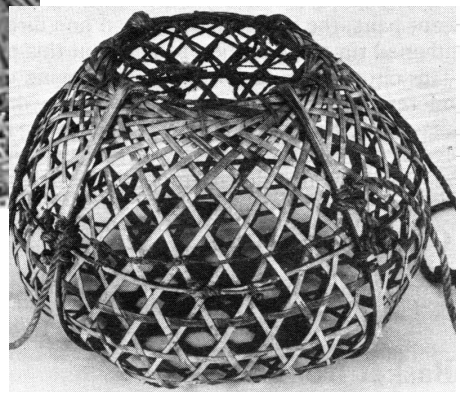
Gaps between strips

Vase

Palited basket from Aasam



Basket from China



Cock cage from a Hakka village in Kowloon, Hong Kong, 20th Century

A dimasa Cachari sieve tray

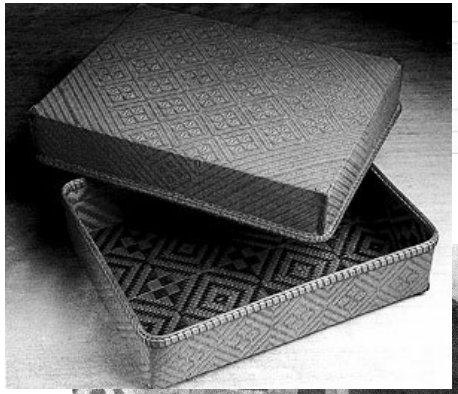
Egg basket from Assam, weaved from outer splits of bamboo.

Colour of the strips

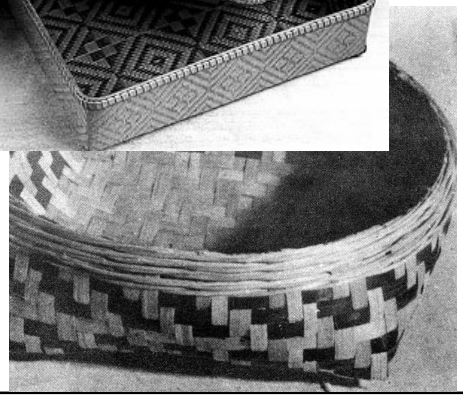
3.6.5 Colour of the strips

Bamboo has inherent reflection quality, so even if the mat is in one colour, elements in different direction reflect differently and give effect of more than one colours. With introduction of some coloured wefts and warps, nice colour effects can be achieved.

Variations in the arrangements of coloured strips are used to produce geometric patterns in woven mats. In China colour of woven articles are different, dim, elegant, rich, vibrant. But the most preferred are which maintain the natural grain of bamboo. These are some examples where colour strips are used to get interesting patterns.



Khan – naga basket , to carry rice and other grains from the fields



General purpose basket from Bastar, Madhya pradesh.

Japanese basket by Watanabe

Colour of the strips

Pot

Tray, from China

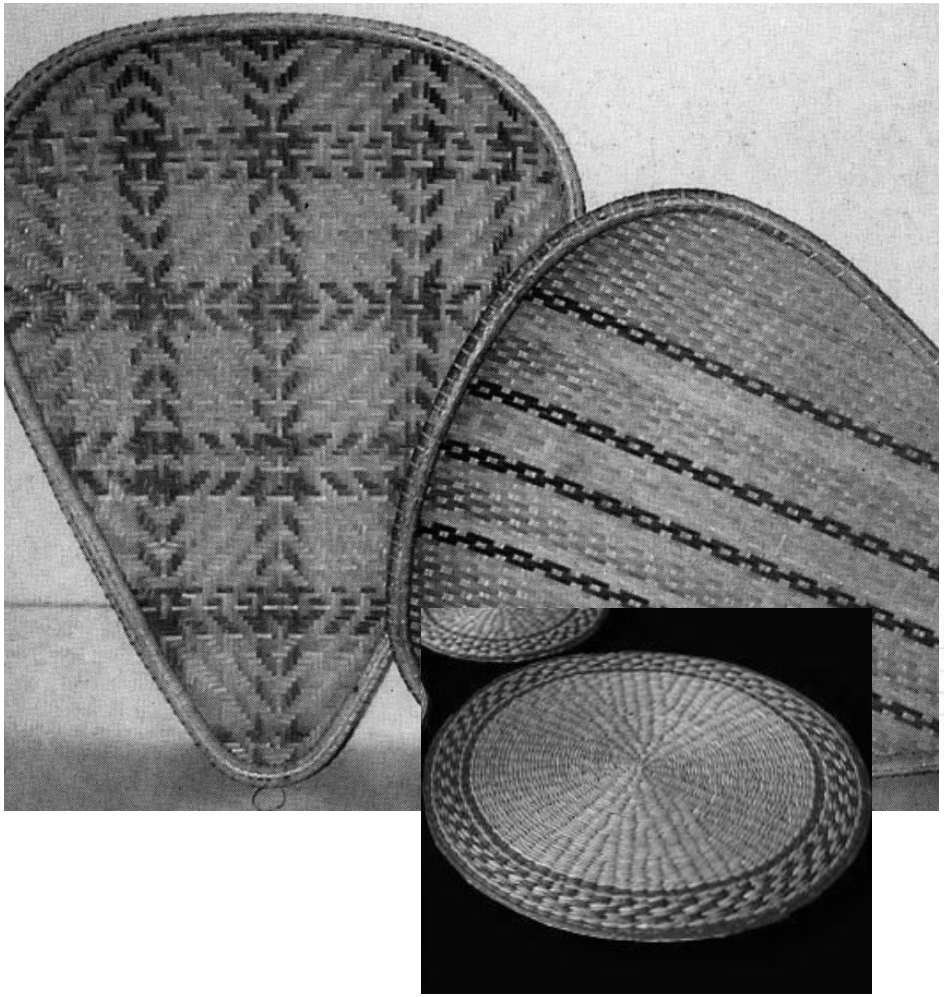
Phingaruk-cloths and valuables basket

Phingaruk-cloths and valuables basket

3 layerd hat worn by Lepchas of Sikkim

Box

Colour of the strips



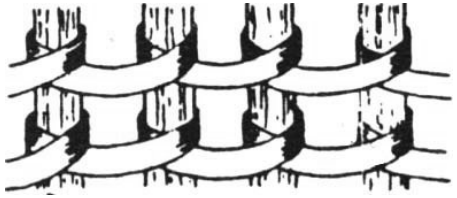
Rice winnowing trays from Malasiya

Tea coaster from Vietnam

Tea coaster from Vietnam

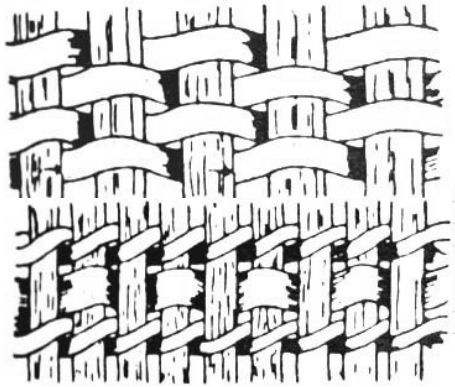
3.6.6 Mehod/ Style of weaving

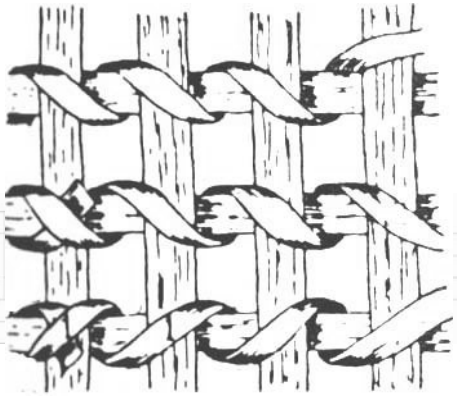
What style of weaving is used for weaving the important, in terms of final appearace of the weave. Masters have developed many types of such styales which are depending on the material properties, the purpose of the product, traditional methods.
1up - 1down weave is followed here but in different weaving styles.



Wrapping

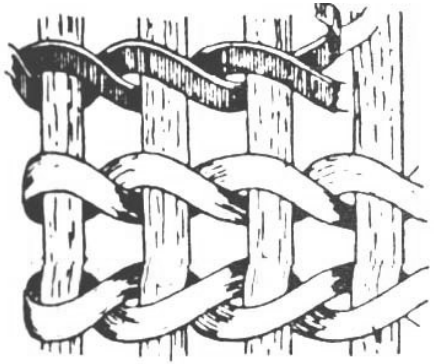
Simple weave

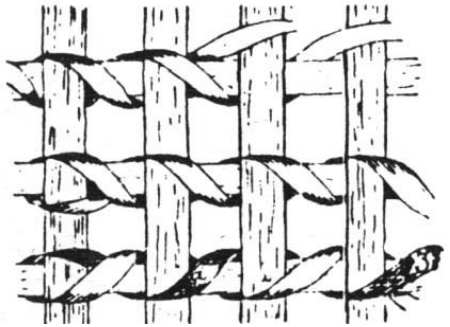




Simple weave with Twining

Wrapped Twining





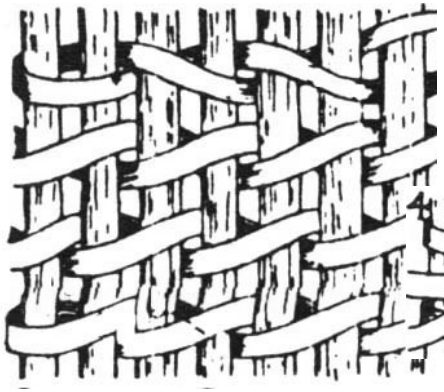
Lattice Twining

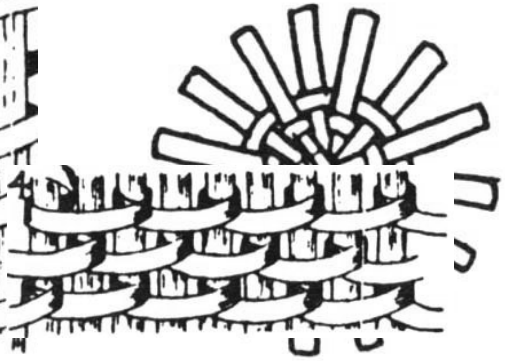
Twining

Method of weaving

Round splint base
with even spokes

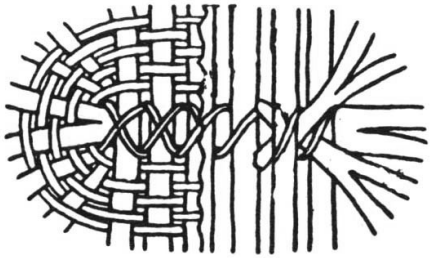
Diagonal wrapping





Round splint base
with uneven spokes

Daigonal Twining

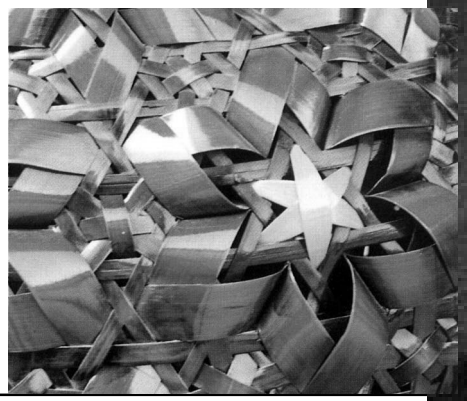


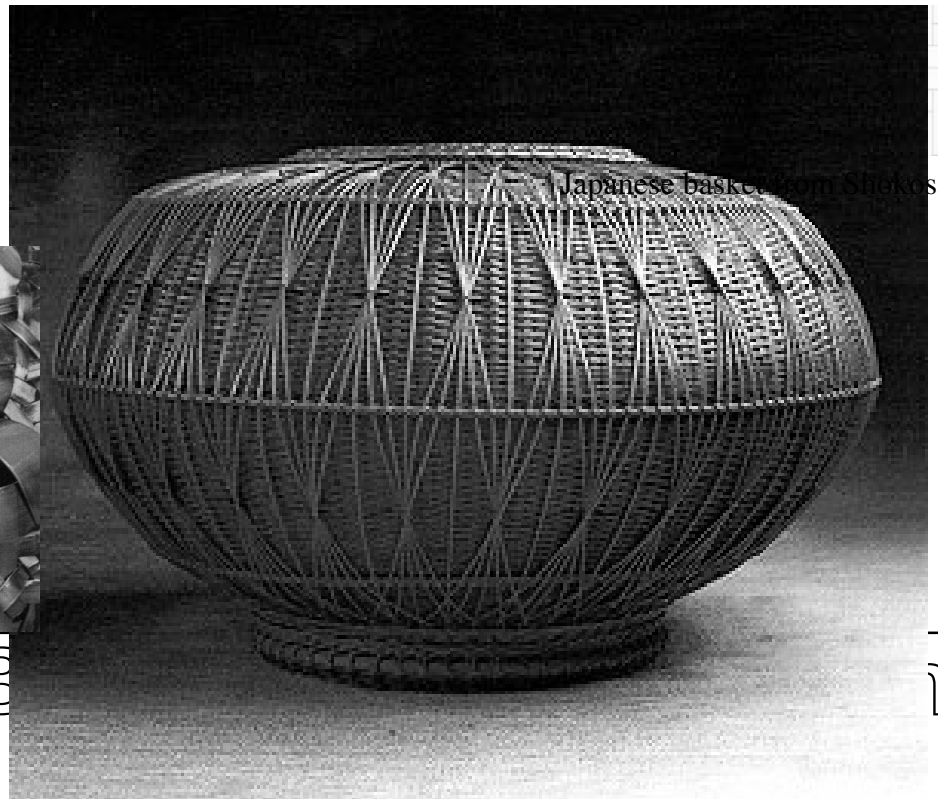
Round splint base
with spokes in pair

Oval splint base

Method of weaving

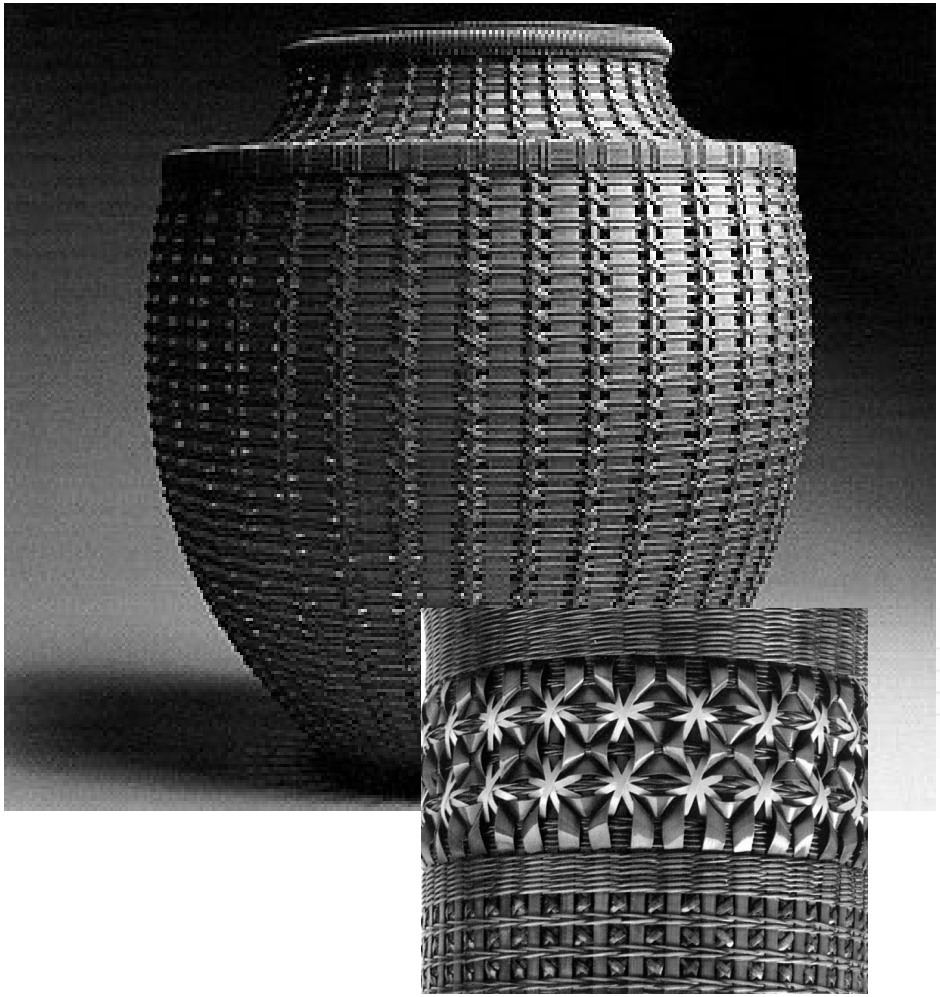
These masterpieces from the craftsperson exhibits various styles of weaving





Japanese basket from Shokosai

Method of weaving



Japanese basket from Motoshi

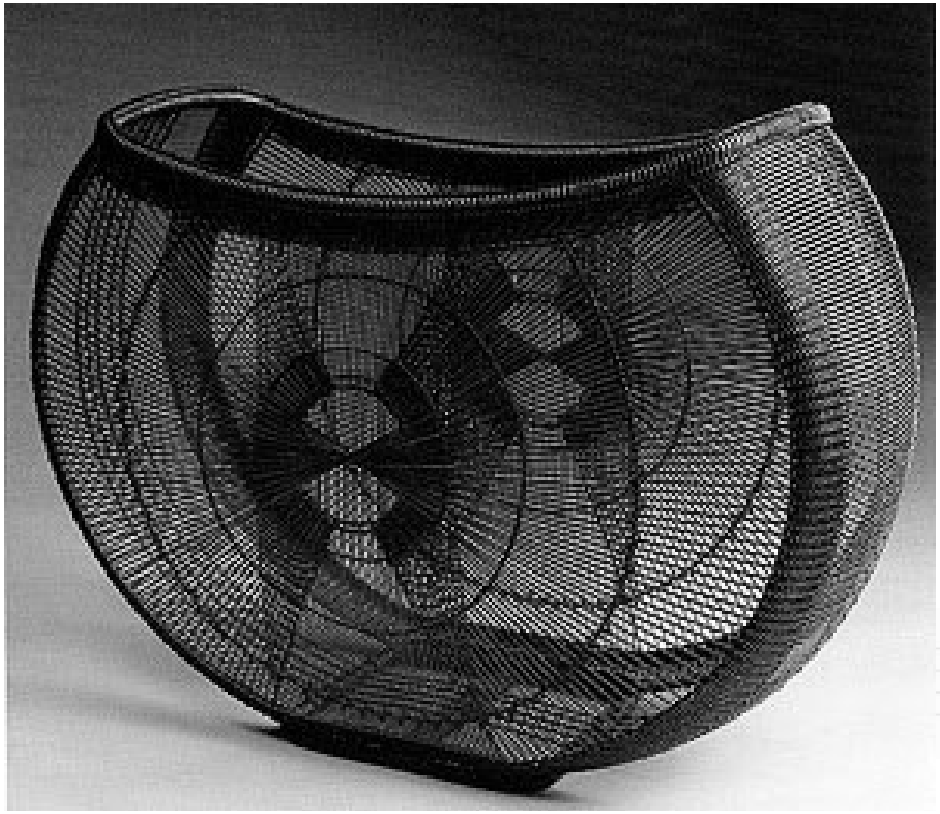
Detail of chinese vase

Method of weaving

Japanese basket from Higashi

Three dimesions of the product are very well used for laying, giving the weaved surface depth.

Method of weaving



Central focus is generated through twisting of the strips.

Japanese basket from Minourachikuha

Method of weaving

Combination of horizontal, vertical andinclined category in a single product.

Neck ornament by Fukuzawa Emi, Japan (1981). Contemporary fashion object using traditional Japanese techniques.

4. Developing new patterns

The master craftsperson are always creating new weave forms and adding to the richness in this field. They add new patterns, but the methodology for doing that is not really described anywhere. One of the goals of this project is to come up with some such methodologies to generate new weave form.

One important thing to be noted while generating new patterns is that, through these variations visual effect of the pattern should change to an extent that it is remarkably different than the other variation. In many cases it may happen, though the parameters are changed physically, visual effect of the pattern is not changing much. Then that variation is not much different and striking. These final visual effects of the patterns can be better checked through the trial i.e. actually making it.

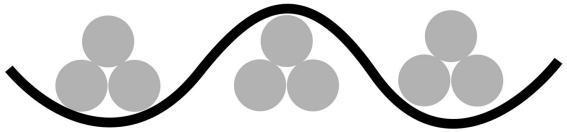
New patterns can be generated by varying a single element. By changing more than one element at a time can result into drastic change in visual effect. E.g. Width of the strips and gap in between the strips can be worked on simultaneously. This change will be more striking than changing width of the strips or gaps alone.

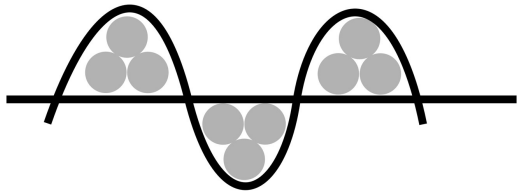
These are some ways to generate new methods

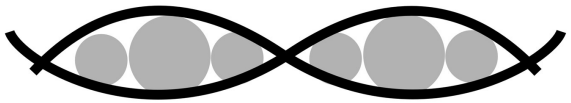
1. Finding the mathematics in existing pattern, applying the same pattern for other pattern in same category or in the patterns of another category.
   Basic pattern
   Repetition strategy
2. Trying variations by exploring the properties of strips used like
   - Cross-section of strips
   - Thickness of strips
   - Width of strips
   - Gap between the strips
   - Colour of the strips
3. Adopting the weave forms from the other weaving areas like fabric or beads weaving.

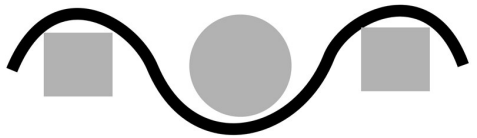
Cross-section of strips

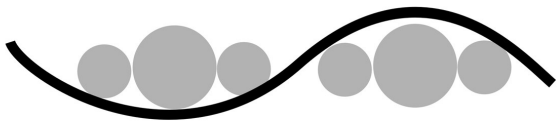
The cross-section of the strips used can be varied to get new visual effects in the weave form.
Below is some of the cross-section exploration.

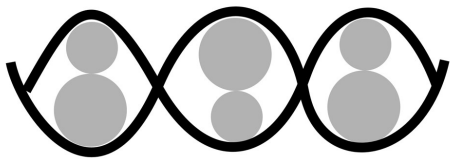












Thickness of strips

When the thickness of strips is increased it becomes very stiff to weave and as a result gaps are created. If the thickness of the warps and wefts is uniformly increased, then the gaps created are also uniform. But if the thickness of only warps or only wefts is increased the gaps created are not uniform.
If the thickness is increased more than 4 mm, then weaving is not possible as the strips start splitting.

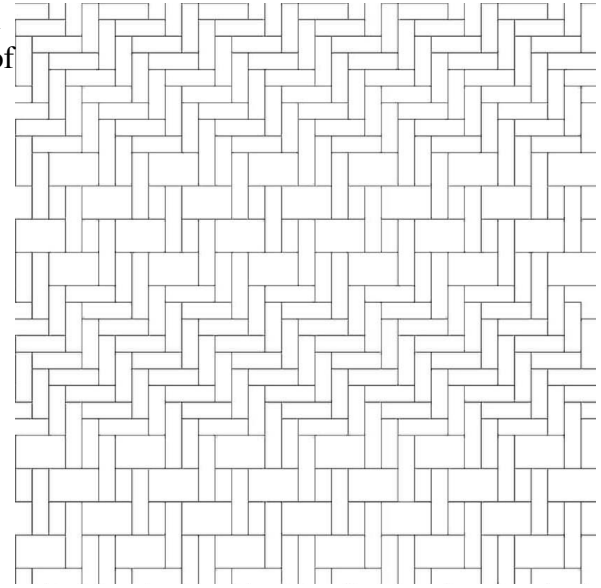
Gap between the strips

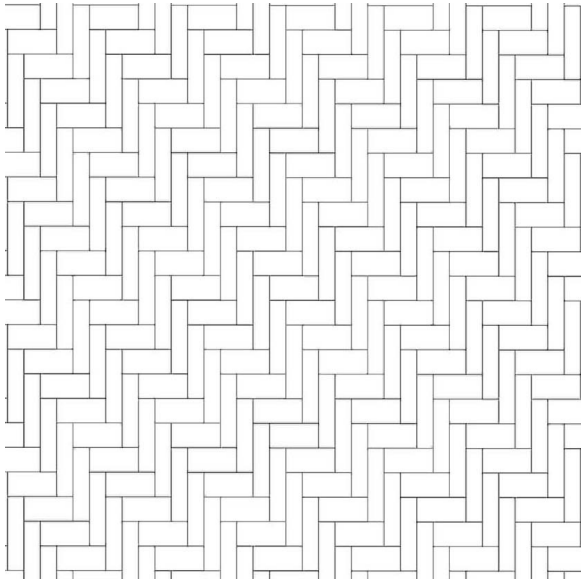
Gap in the elements makes the weave look lighter. In hexagonal weave patterns, gap becomes very important element. There are already so many existing variations tried out with gaps in the hexagonal weaving patterns.

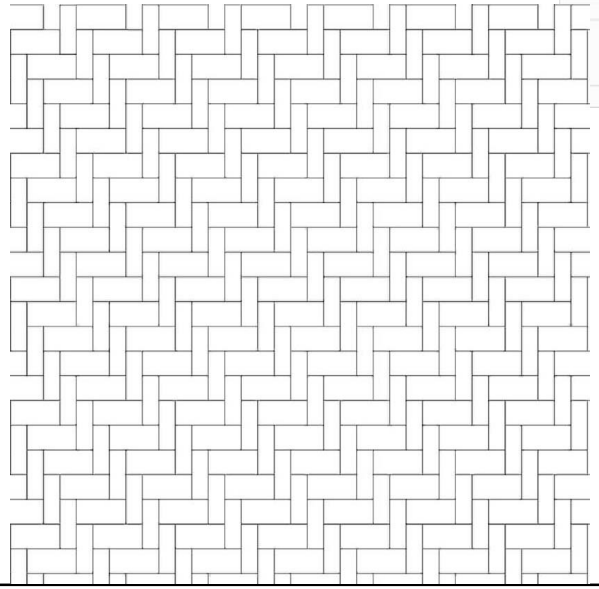
Width of strips

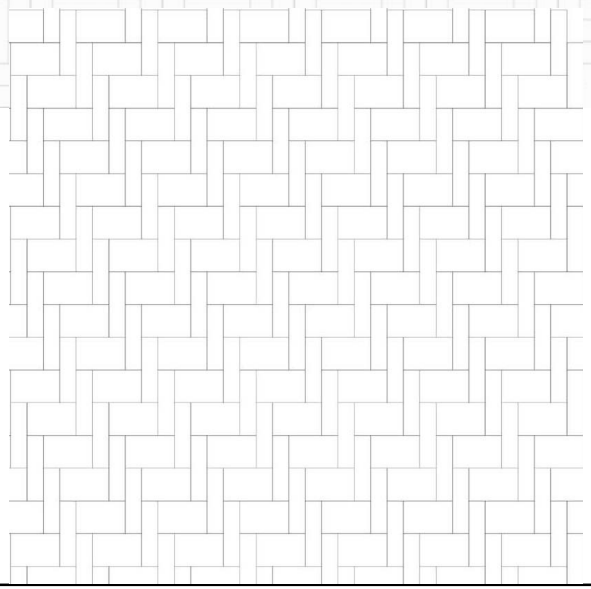
New patterns can be generated with the variations in the warps and wefts. As the weaving process follow some grid, this change in the width of the strips has to be in some proportion of the basic grid. The grid decided by the minimum width of the strip.

Basic weave 3 up- 3 down
Variations with the widthof strips

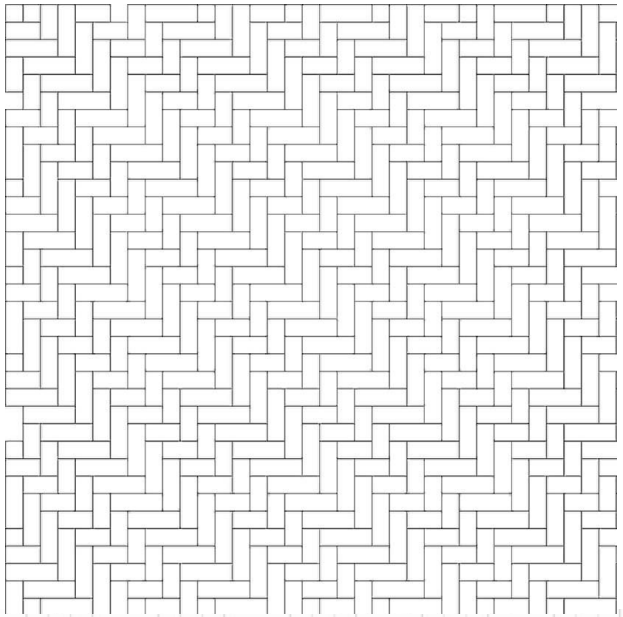


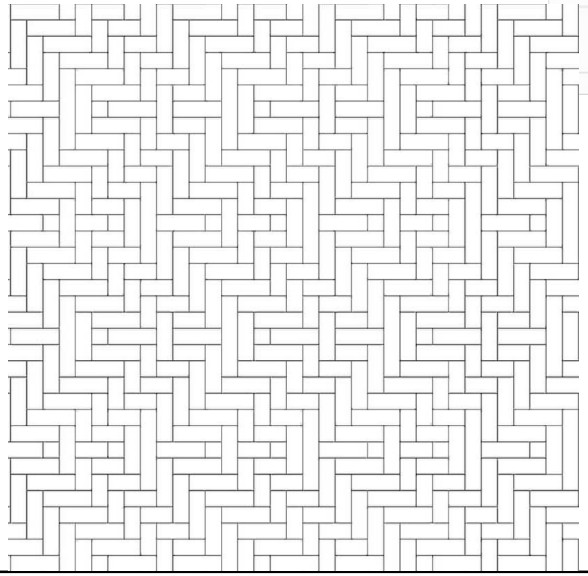




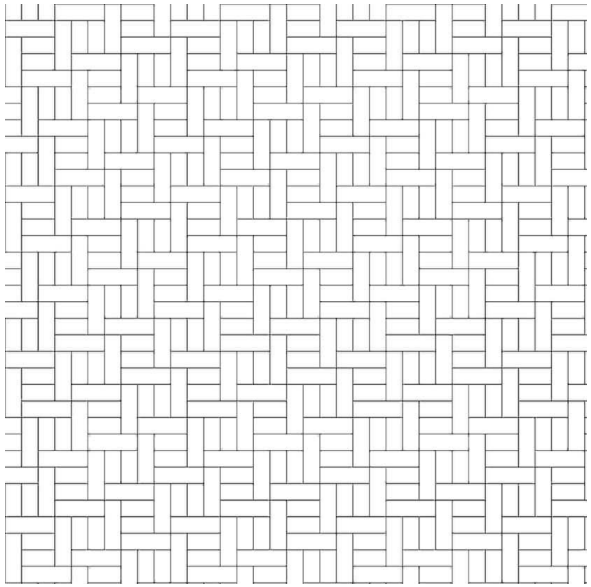


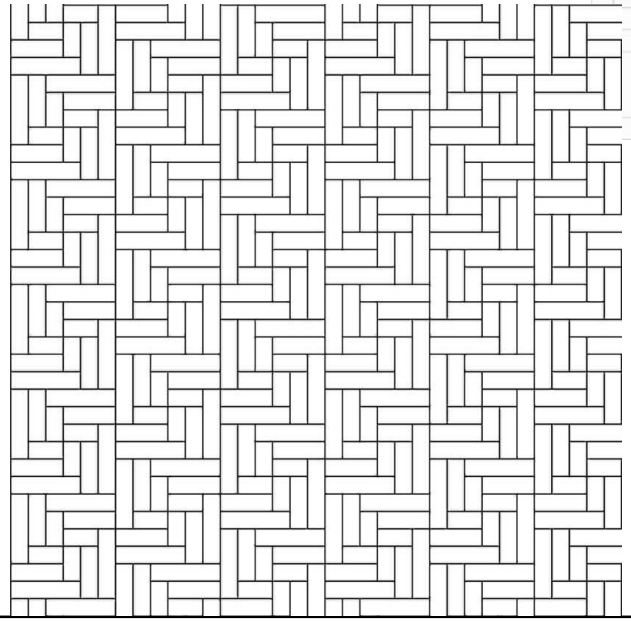
These are weave forms are generated with overlaying of the two existing weave forms.



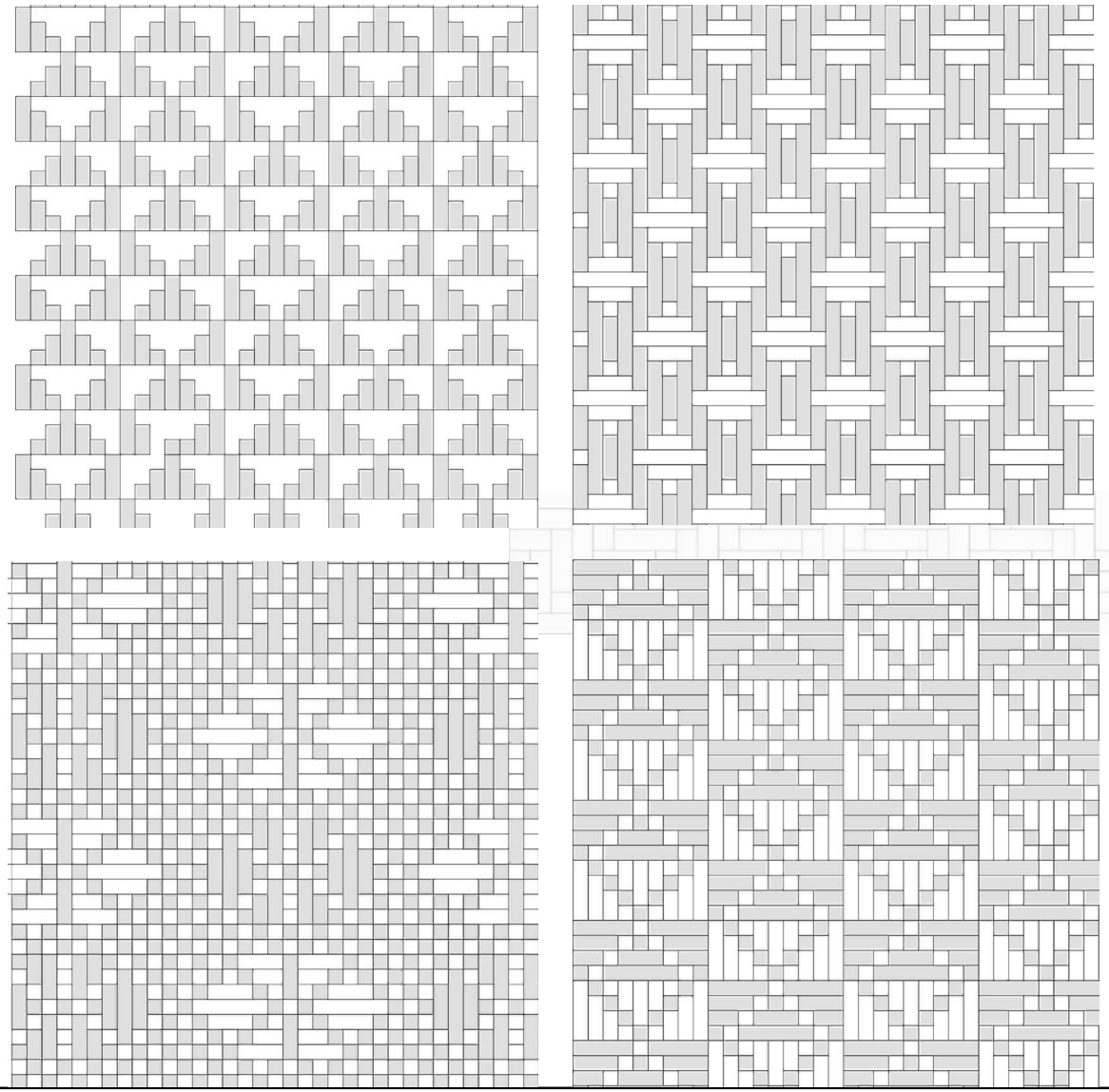


The weave patterns generated with the combinations of new equation of the ups and downd of the weft.
The strategy used was to follow metaphor, Swastik





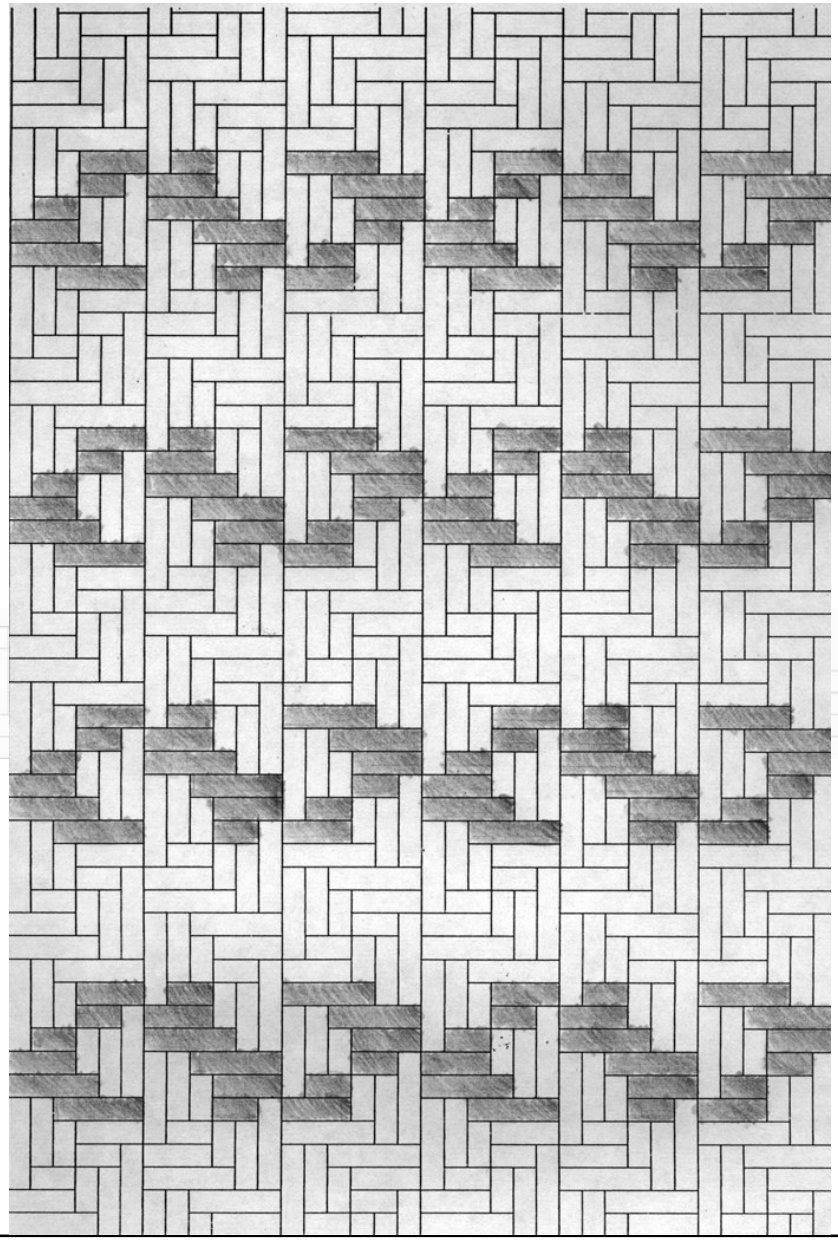
These weave forms are generated by adopting weave forms in the fabric.

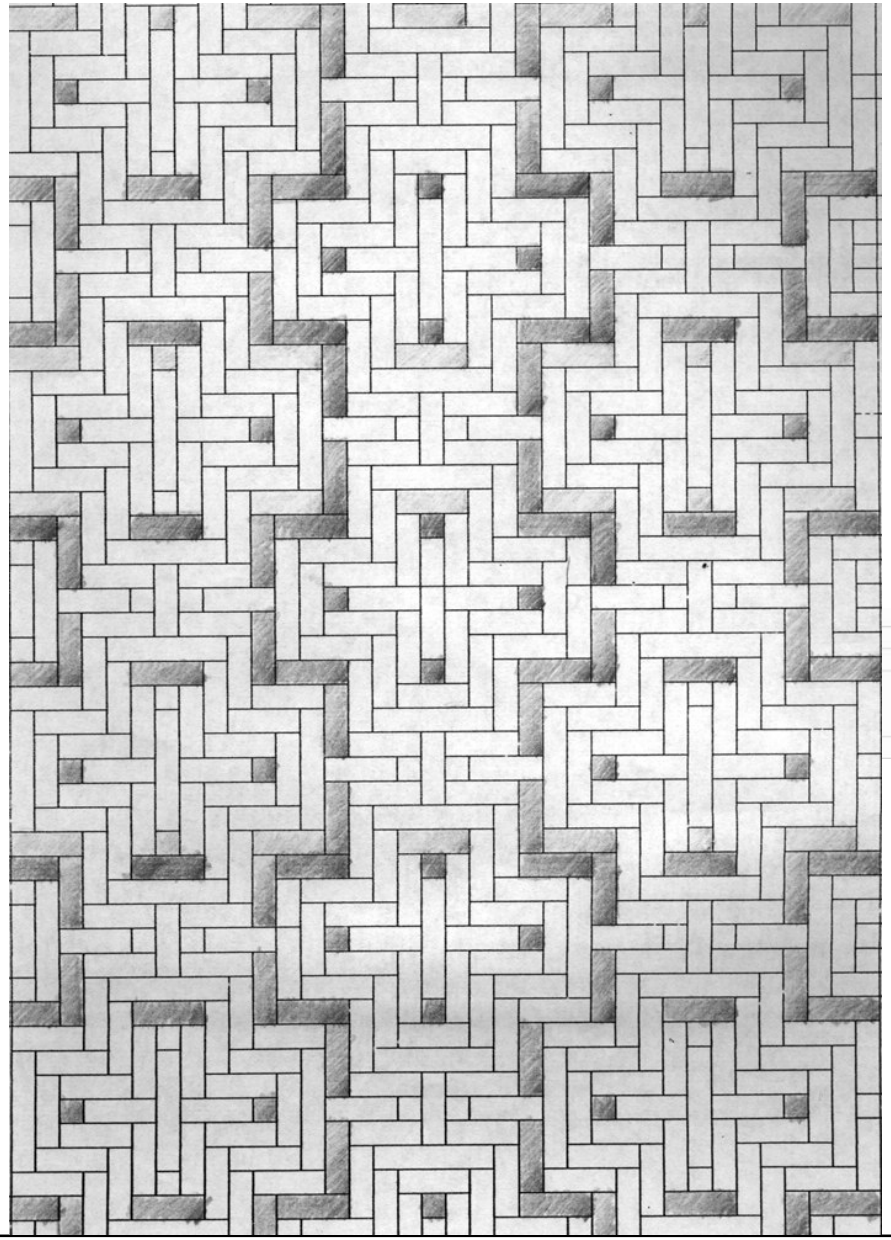


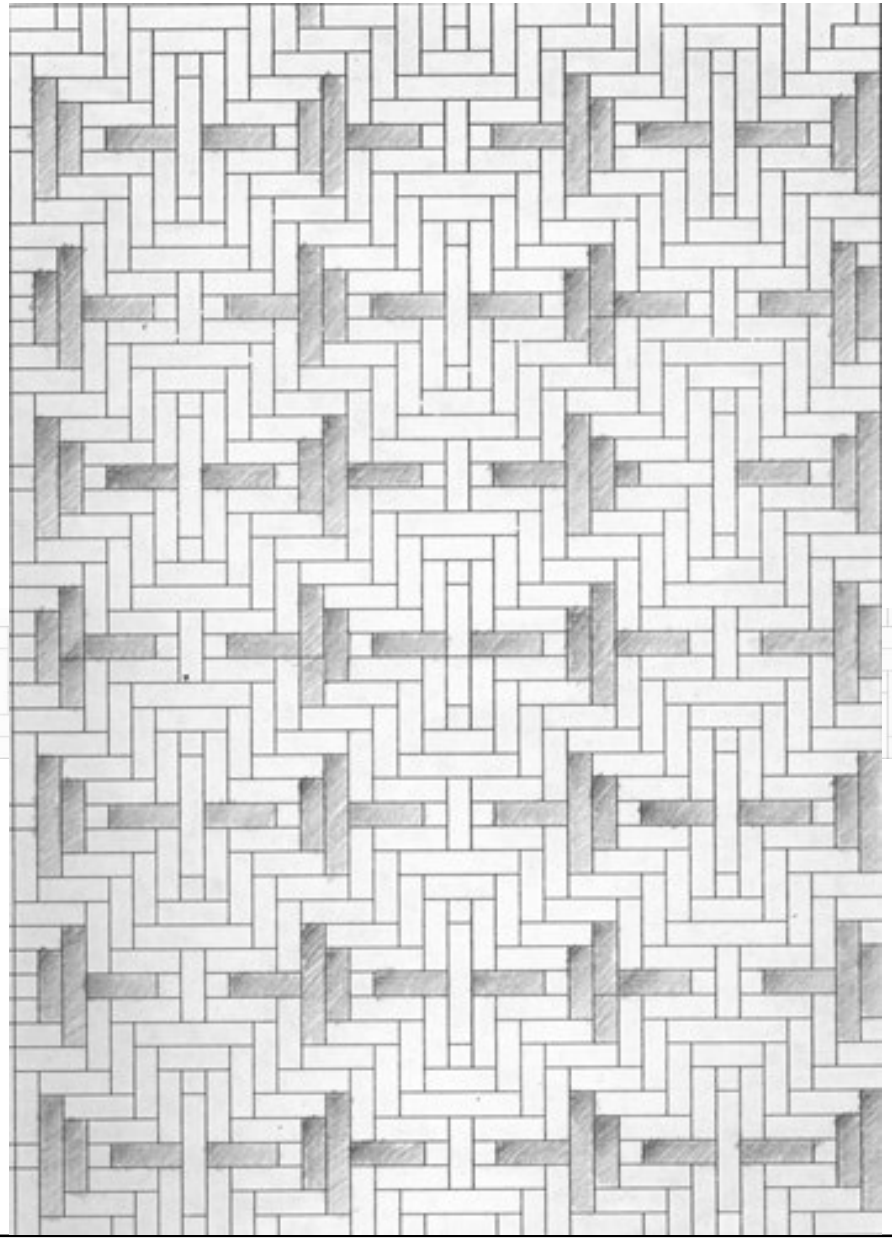
Colour of the strips

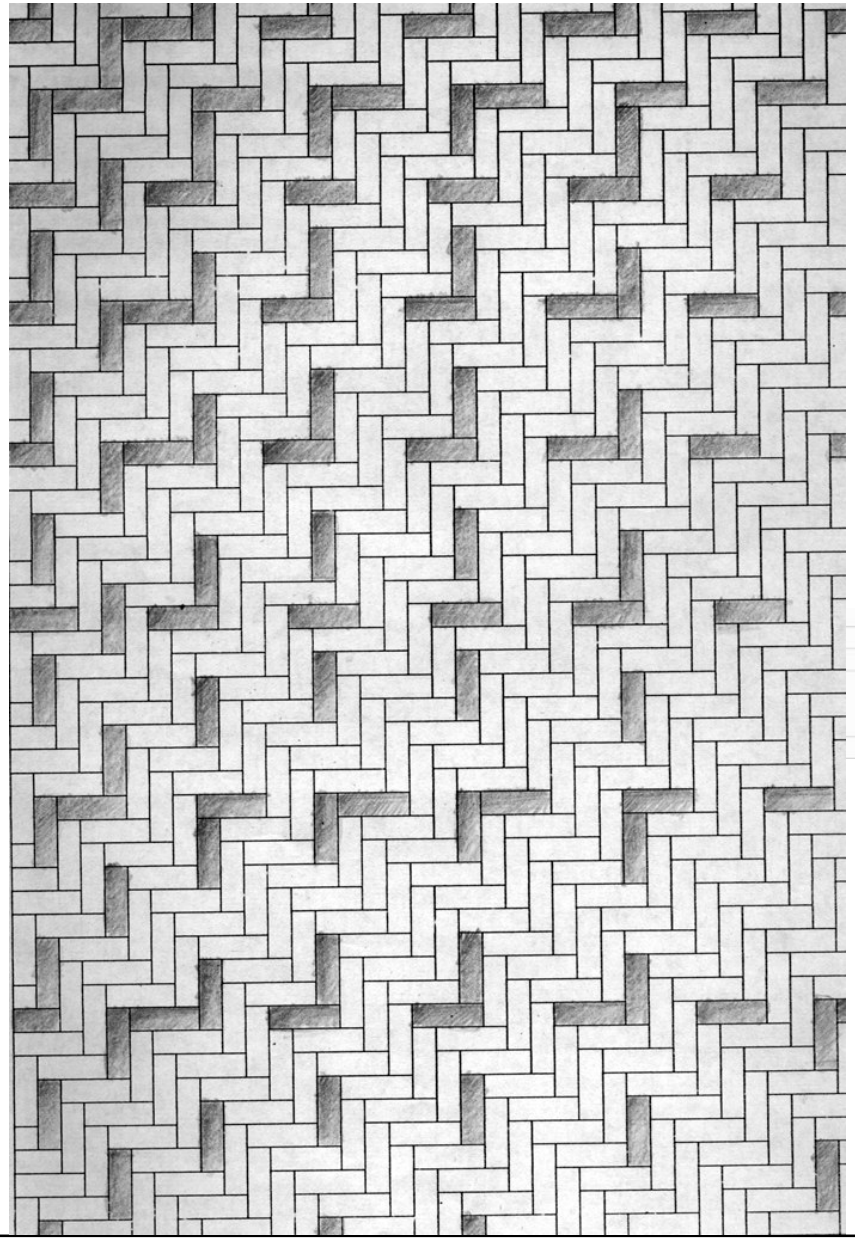
As mentioned earlier, bamboo mats even if in single colour strips, there is a effect of two colours through the reflection. Adding colour has tremendous potential to come out with new patterns.
There are so many variations possible by adding colour strips. But to come with a striking pattern is important to generate new variation. Unless there is some strong visual impact, some motif or some cohesive effect through the colour variation it doesn't look meaningful and it is not remembered also.
One method to come up with such meaningful new patterns is to adopt some metaphor which can be related. Some of the metaphors can be
Nature – Flower, leaf, tree, branches, waves, shell, creeper, hills, fire
Geometry – Spiral, continuity, crossed, interlocking
Qualities – Freshness, Stable, heavy, energetic
Relationship – Intimacy, closeness, loneliness, formal, informal
Traditional motifs – Swastika, torana, koyari

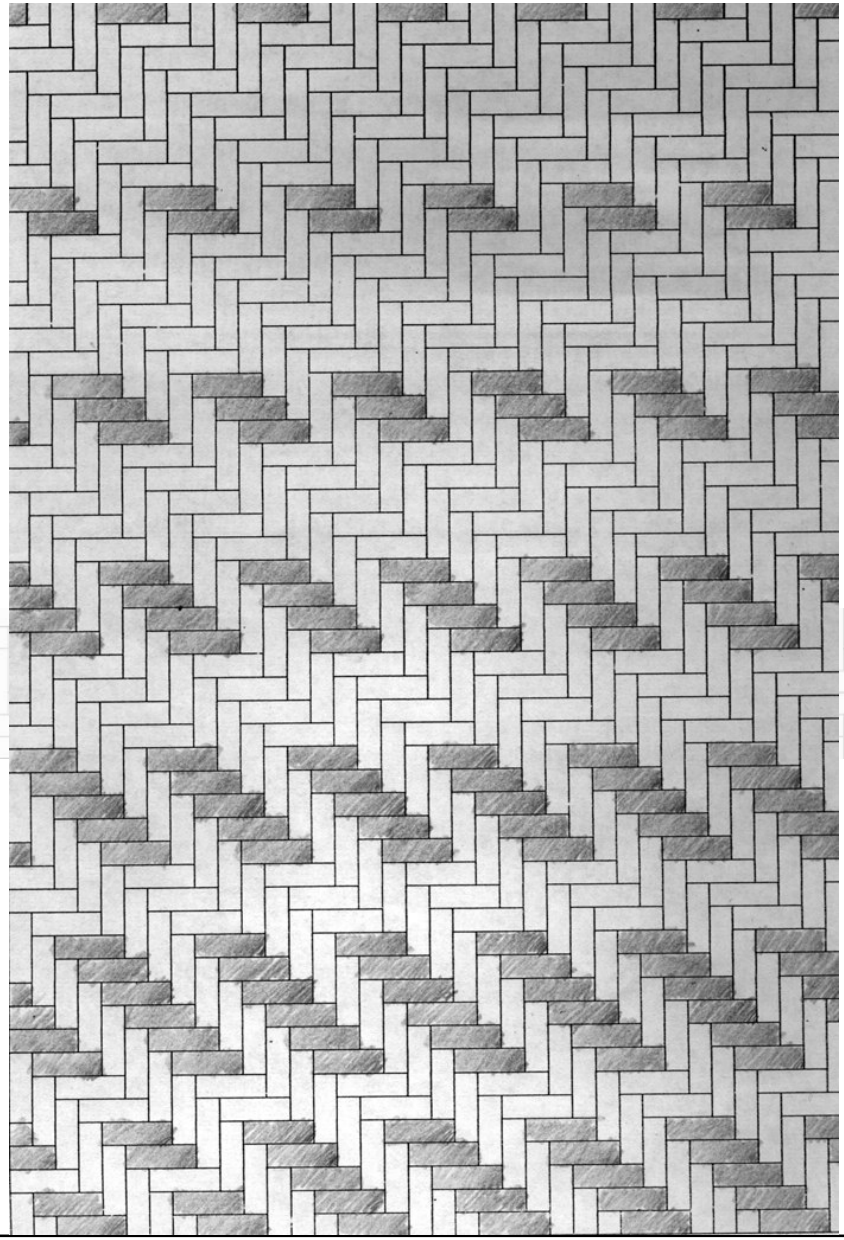
While trying out variations in colour I tried various strategies like mirror symmetry, staggered symmetry, overlay of two patterns. Such type of strategies help to come up with some distict patterns otherwise colour may hamper the rhythm in the weaving pattern. Adding colour ina weaving pattern is not like application of colour to plain surface. The woven surface already has its own rhythm, texture. Adding colour thus becomes a careful task in the weave forms.

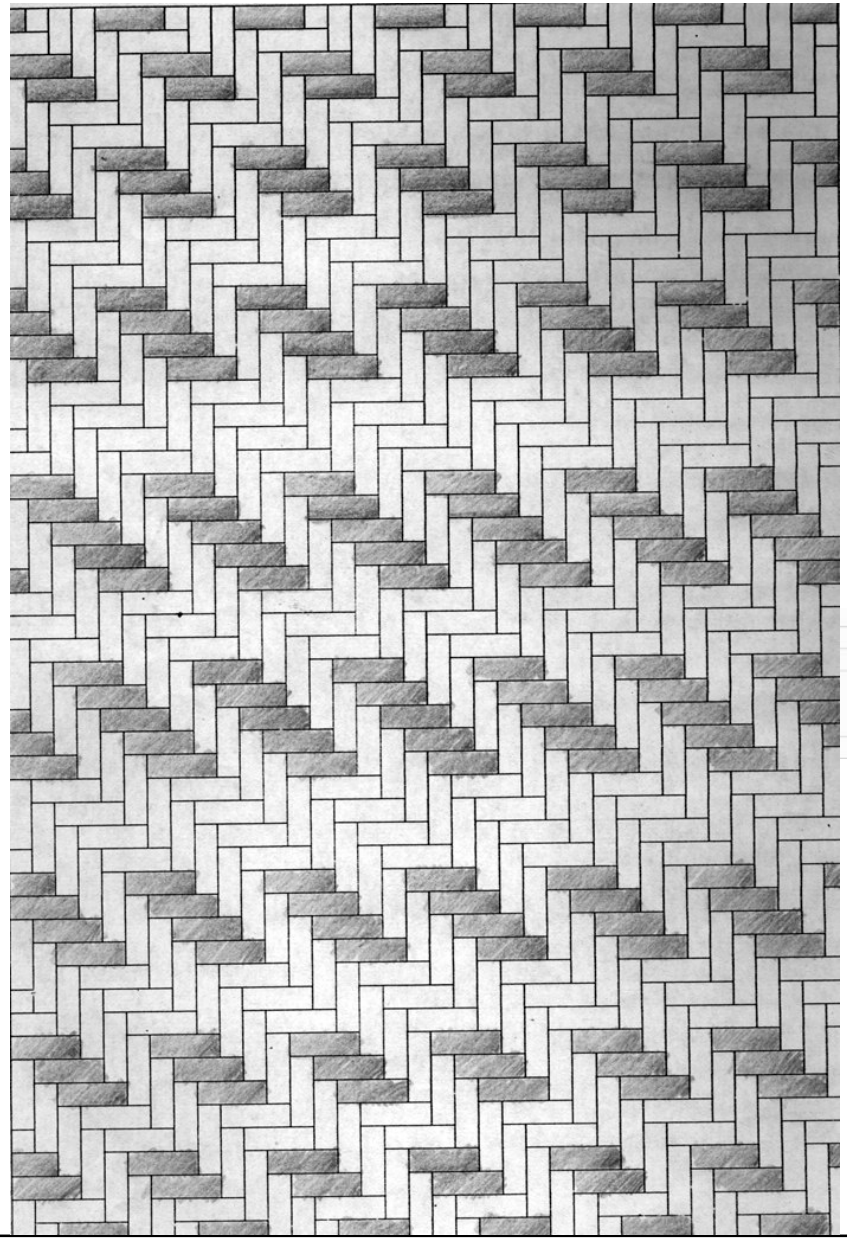


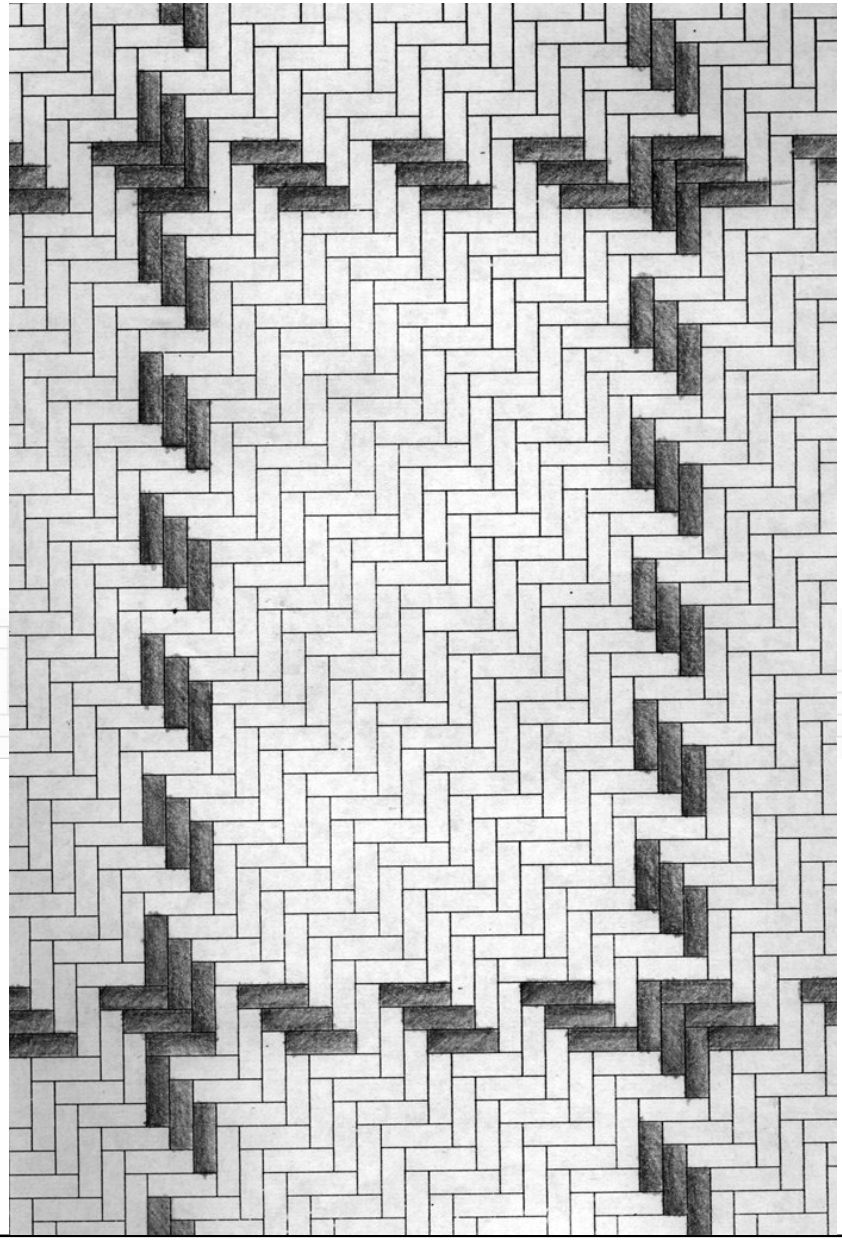












5. Aid to teach and learn weaving process

The main focus of project was to develop the classification. This is a supportive work thorough the observations which were made during the learning session.
Learning to actually weave a simple mat was really a wonderful experience. The initial jumbling between the warps, which ones to be kept over and which ones should go under the wefts, then seeing the pattern developing row by row was enjoyable.
One is amazed by seeing the master's actions. For them the action of weaving becomes automatic when they start doing it. They don't have to consciously remember the sequence of warp and weft arrangement. They reach this stage through the practice. One wonders at the absolute regularity in the spacing of the elements, and the orderly repetition of the stitches. To attain such a machine like precision the weaver relies only on the regularity of his movements and the relative uniformity of his prepared material.
Weavers in one region practice and make only the traditional products which are being produced in that region for long.

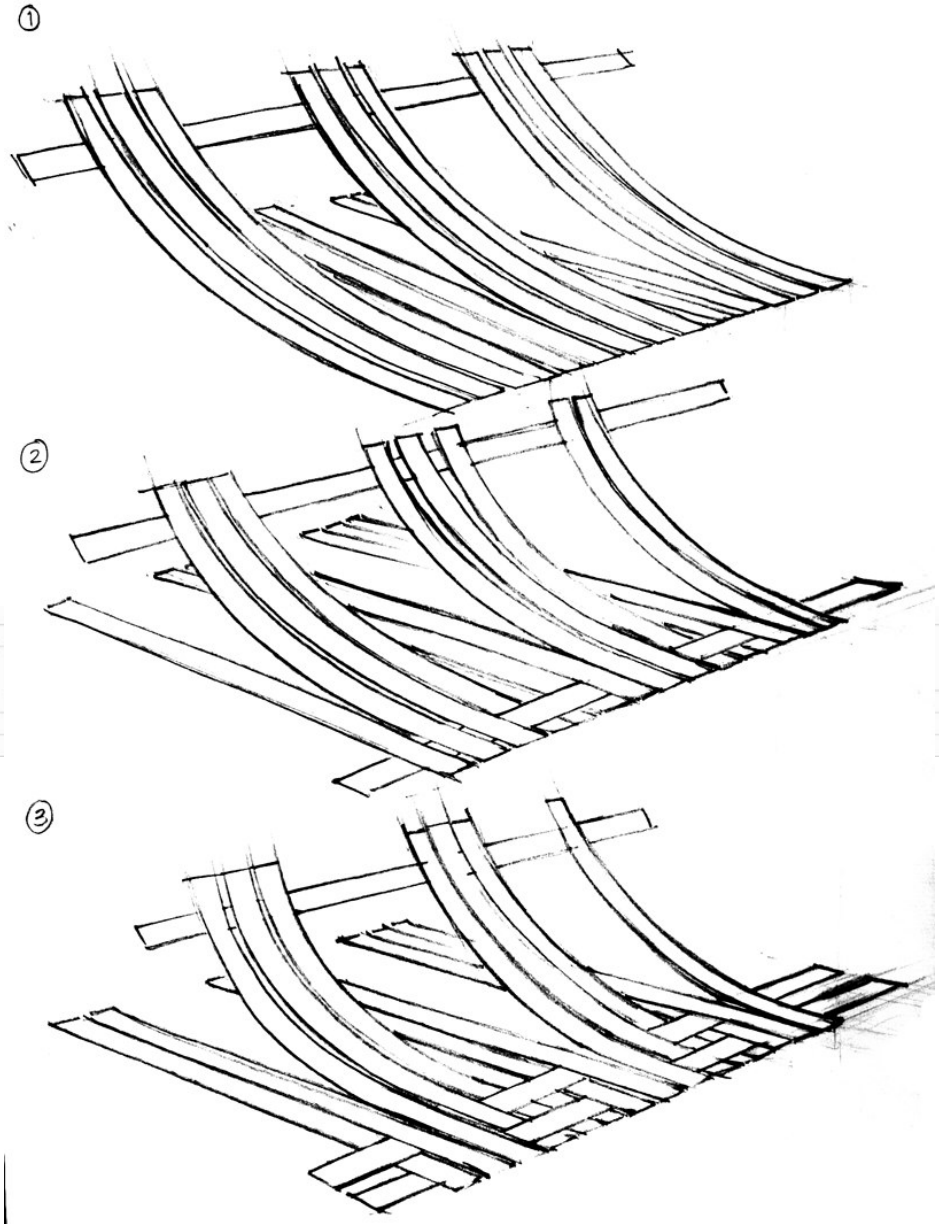
How learners learn the process?
Previous generation transfers the knowledge to the young generation who pick it up very fast. They are seeing it from their childhood. They need no samples or sketches to learn the weaving process. They just follow the instructions given to them.
To teach or learn the process, any kind of aid is not available. If craftsperson is interested in learning a new pattern or type of weaving which is not practiced in his/her region, one has to be totally dependent on the tutor or master knowing that weave. To learn these new weavings also, there is no aid available. There also they just have to follow the instructions given by the master/ tutor. They are not given any sketches to make the learning process simpler. And they are not used to refer such sketches or samples to make the weaves they already know. So they cannot follow any sketches quickly. Thus the process of learning becomes very subjective. If the tutor can explain the steps to be done clearly, then only the learner is able to pick the weave. The tutor has to be there physically around, watching whether the learner is doing it right or not. If the craftsperson is not able to understand what the tutor is saying, then he/she is not able to learn the new process, though he / she may be capable of doing.
Some universal notation or decoding method has to be generated which the craftsperson can understand easily. From that notation the craftsperson should follow what exactly is the sequence of warps and weft arrangement. Once craftsperson starts following that notation, there is no barrier of language or of any kind to understand a weaving pattern which is practiced in other region.

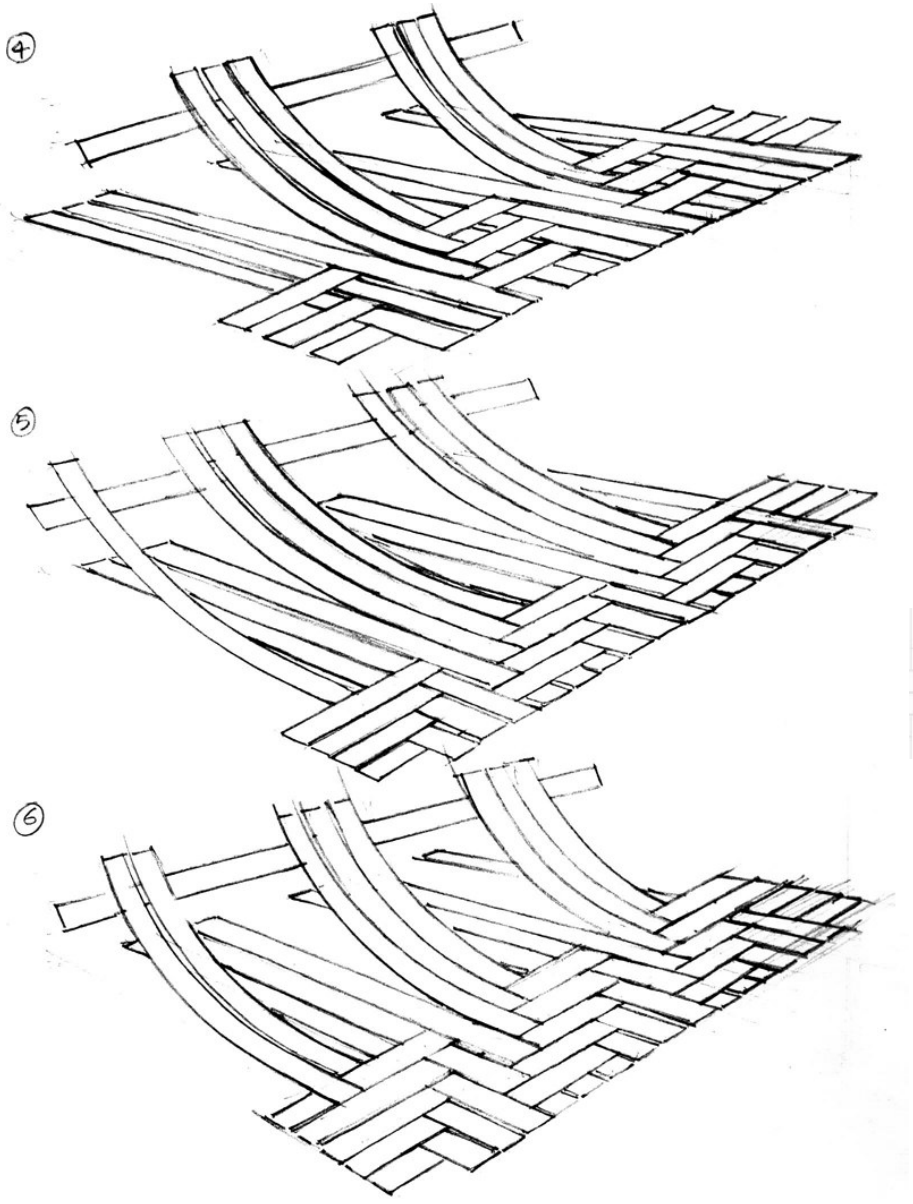
Weaving a mat

Following is the step by step sequence of a simple weave with only horizontal and vertical strips.

1. Take manageable vertical elements (warps) of desired length.
2. As per decoding, start picking up and keeping down the warps.
3. Insert the weft through the warps.
4. Again repeat the same process of picking up and keeping down the warps, as per next rows decoding. And insert the warp.
5. Continue this process till all the wefts are weaved.
6. Then turn the mat in 90 degrees.
7. Now all the wefts become warps. Again follow the same procedure and insert the wefts as per decoding, till the mat is completely woven.

Note:
Sometimes the weaving starts from the centre of the mat. It becomes easier to follow the pattern for weaving process.
For circular weaves the mat has to be rotated throughout the weaving process, as and when required.

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Observataion

There is common terminology of ‘up and down’ or ‘over and under’, which the craftsperson follows while actually making a weave, in spite of his region. This is common all over. It actually refers to how many warps have to be picked ‘up’ and how many has to be kept ‘down’, while inserting a weft. This same terminology can be used further to aid the teaching and learning process.

There are two types of learners.

1. Those who are learning the weaving process for the first time.
2. Those who know weaving process, but are learning new pattern or new method of weaving.

The aid for learning has to be different for these two different groups. For novice users it can be some video demonstration along with the notation. While for the second user group it can be just the notation. Notation has to universal, so it will be same for both the groups.

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