

Creating Texture with Pleats, Fulling and Shrinkage

PLEATS

There are various ways to create pleats in weaving, for the purpose of this presentation will discuss warp derived pleats and stripes.

Pleats using structure

The first group of samples and drafts utilize a twill structure to generate folds and pleats in vertical stripes. Most of the samples use colored stripes which not only identify the twill direction but give a pleasing color block or reverse color effect.

Important factors to consider

The weight of the yarn

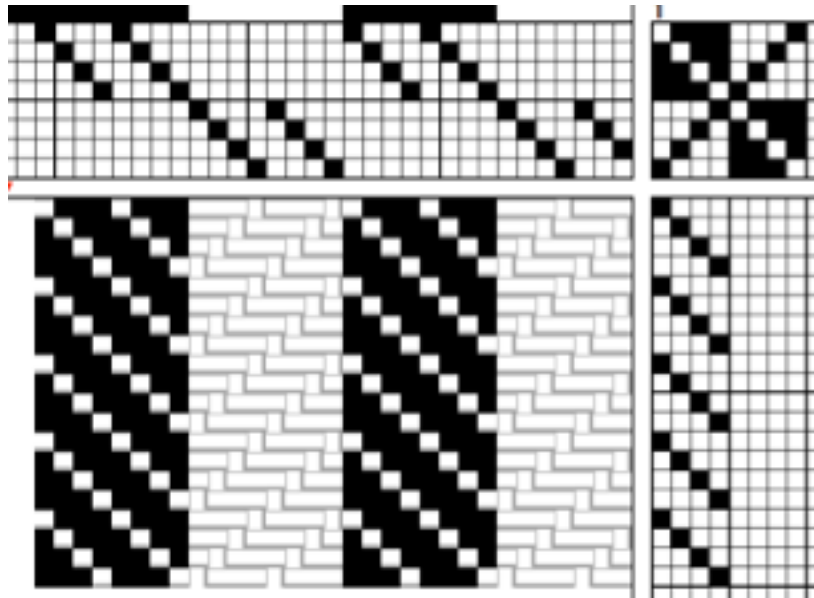
The width of the stripe (height of the pleat)

EPI - the sett (which provides the tightest or softest pleat)

PPI - the density will affect the ability to pleat (we all have our own beat & tension)

Sample 1 = 8 Shafts, 8 ends in a stripe, structure 3/1 & 1/3 twill sett at 15EPI, 16PPI

(Fig. 1)





Samples 1-4 use Bambu 7 (equivalent to 3/2 cotton) with 8 ends in a stripe, same weft.

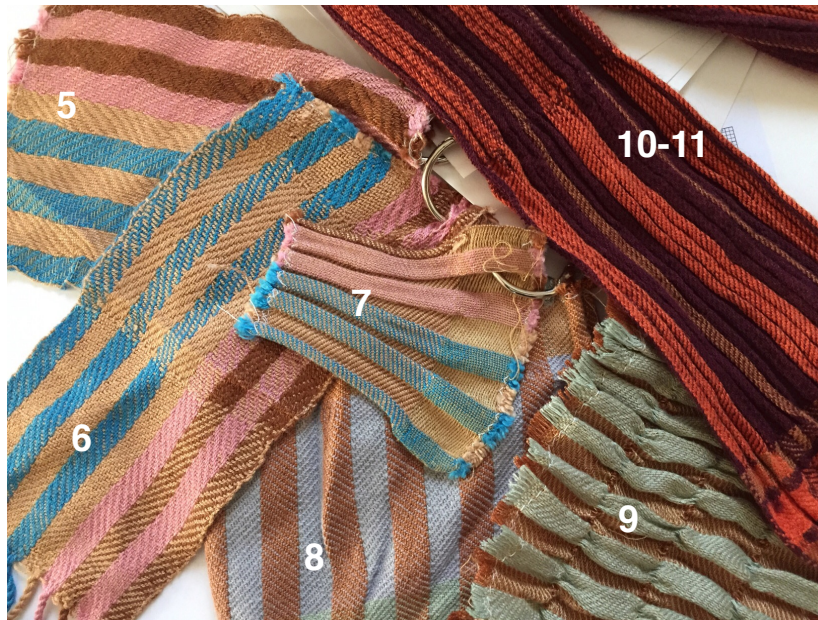
The 1st sample is sett at 15EPI, 16PPI, the fabric forms a small ripple but not a pleat.

The 2nd sample on the same warp, uses Bambu 7, but also a fine twist wool (cream) and then a grey merino wool. Both the wool and merino yarns add a little more pleating action.

Sample 3 is re-sleyed to 16EPI and 18PPI, this generates a definite pleat. Where the twill changes direction you can see a shift in the direction of the pleat.

Sample 4 is the same sett as **3** but uses a fine polyester weft, the beat is not adequate to generate a pleat

*From these samples we can conclude that using a structure with an adequate float (3/1 and 1/3 twill) and using a tight sett and even tighter picks per inch, we can generate pleats. It is the reversing of the twill and the tension of sett and beat that causes the pleats to form.



In Sample 5 we use a finer yarn - Bambu 16 (16/2) and increase the stripe to 12 ends per stripe. The sett for the finer yarn is 30EPI and 32PPI the weft is polyester with pleating threads which are pulled taught to create pleats, the sample is steamed. Upon ironing the pleats are lost.

Sample 6 uses the same as above with bambu 16 weft, insufficient pleats.

We then tighten sett in **sample 7** to 34EPI and 36PPI with successful pleats.

Sample 8 uses 16 ends in a stripe sett at 30 EPI and 30PPI no pleats. The weft is a fine Cashmere which is a soft ply.

Sample 9 on same warp uses fine polyester with pleating threads - after steaming the pleats are successful.

Sample 10 & 11 are finished products with 16 threads per stripe, 32 EPI 34PPI. Sample 10 uses high twist wool and bambu 16 - the pleats are successful. Sample 11 is a Cashmere weft.

*Each weaver has a personal hand, some weave with more tension and tighter beat, some more softly, use the above as guidelines and keep good notes on which combination works best for you.

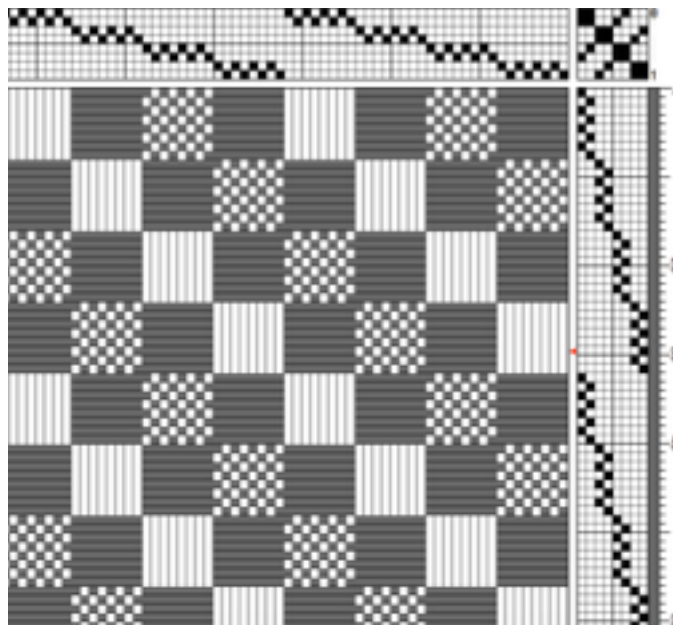
Fulling

The next method will utilize a yarns ability to full or almost felt. Some yarns are specially treated to prevent the fibers from latching onto one another and are labeled “superwash” and will not be successful for this method, however this is not to say they should be disregarded and could have potential in other applications discussed later.

One of the best yarns for this method is merino wool, as it can be taken through various levels of fulling through to felting. Once again, sampling is key! One too many soaks in hot water can take a beautiful piece of weaving to a matted and felted state. Keep good notes and wash carefully.

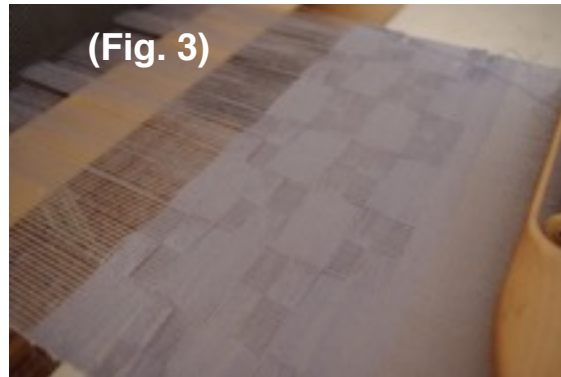
The structure used below is a combination of simple plain weave and long floats. The longer floats will full as they are allowed to move during washing leading to a binding of the fibers. Depending on how the blocks of plain weave and floats are put together will give different type patterns. The more floats the more movement, the more fulling.

The following draft (Fig. 2) is that of **sample 12** - fulled merino. The cloth was sett with a balanced weave of 16EPI and 16PPI. On the loom it appears quite open and maintaining an even beat is key. A soft and even beat works well, some movement of the floats during weaving is normal, the fabric will stabilize during wet finishing.

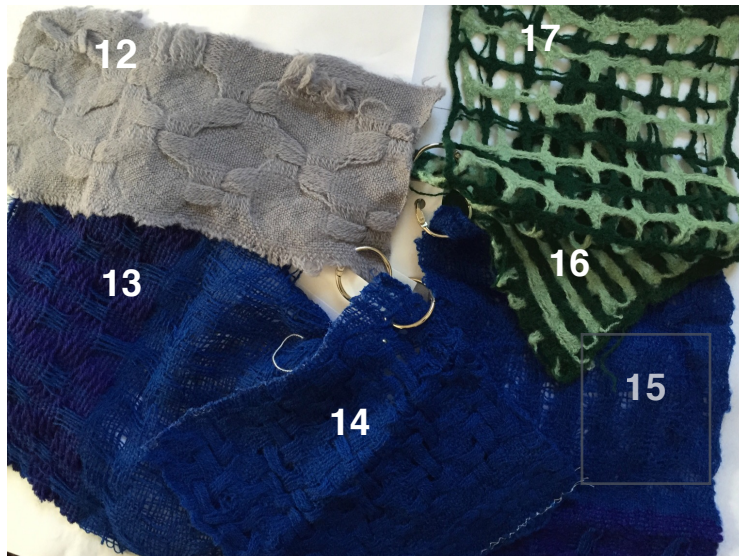


(Fig. 2)

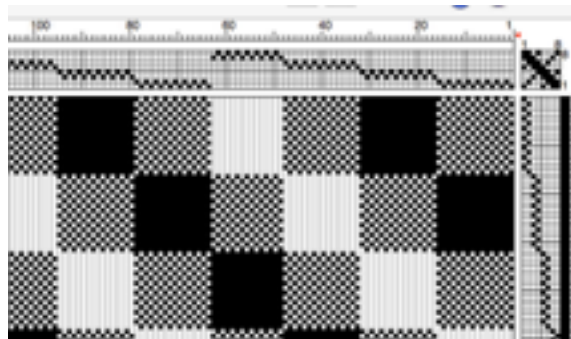
Below is the sample on the loom (Fig. 3) You can see four adjacent squares of floats with small blocks of plain weave.



The **samples 13-15** use worsted wool and super wash sett at 12EPI 12PPI



(Fig. 4)



Sample 13 & 15

In **sample 13** there is little fulling. **Sample 14 and 15** are sett a little more closely. **Sample 14** uses the draft (Fig. 2) with more floats, **Sample 15** uses (Fig. 4) less floats.

Samples 16 is merino wool sett at 16 EPI and is almost felted, the draft is a lattice design. **Sample 17** uses a more open sett of 14 EPI and extra space in the reed to prevent the fibers from locking down and over fulling.

Fulling is done by washing in hot soapy water with gentle squeezing and then rinsing in cooler water. Alternating hot soapy water with cold ice water adds a little more “shock” to the yarn. This causes the fibers to open up and with friction the scales bind together, the cold water locks the scales.

Sometimes 3 - 4 rounds may be needed to achieve desired effect. The floats should be slightly bound. Keep good records of the fulling process during sampling, one too many washes/rinses can create a matted mess!

*We can conclude that yarn choice is key, ability to full/felt is key to the success of this method and careful washing and rinsing to achieve just the right amount of fulling should be determined during sampling. The proportion of plain weave vs floats can be used to create more distortion.

Differential shrinkage /Collapse and/or active yarns

Another way to create folds, pleats or collapse in woven fabric is combining structures (for example plain weave and twill or satin combinations) and/or active yarns or yarns with different shrinkage values.

The samples numbered 18-25 are woven on a warp of fine linen singles in an 8 end stripe, alternating with a fine slightly high twist wool 8 end stripe. (note - if using yarns with very different properties such as linen with no “give” - consider beaming the 2 yarns separately)

When experimenting with differential shrinkage/collapse there are several approaches and considerations.

Suitable structures and Combinations of Structures

Deflected doubleweave is a great structure for playing with differential shrinkage. Using a yarn that has a significant shrinkage factor along with a yarn that does not shrink (for example merino used with a fine rayon or tencel) will create pockets and bubbles.

Combining a weave with more interlacements with a weave with longer floats - (for example plain weave with an 8 shaft satin). The longer floats in conjunction with the shrinkage factor will allow the fabric to buckle and collapse/fold. Twills with reversing face or directions can give pleasing results.

Active Yarn or High Energy yarn - an active or high energy yarn is one with an over twist or a degree of elasticity. Yarns with Z or S twist will cause directional variations.

Things to consider

- Shrinkage factor - how much will the yarn contract?
- Sett - how loose should the sett be in order to allow the floats to move for shrinkage to take place?
- Draw in factor - These types of fabrics lose a great deal in width once removed from the loom and wet finished



The linen and wool stripe warp was originally sett at 24 EPI with soft beat. **The samples 18-22** are slightly different structures, blocks of plain & twill, plain & satin, twill stripes.

Samples 23-25 were re-sleyed at 28 EPI and result in a better fabric. **23** uses a high twist crepe (active yarn) - **Sample 25** uses a fine wool and a thicker wool.

CONCLUSION

The samples and methods reviewed above merely scrape the surface of creating folds, collapse and movement in a woven fabric.

Most importantly:

SAMPLE - sometimes think beyond the conventional use of a structure or yarn property and explore combinations of techniques.

SETT - be willing to change and adjust sett until you reach your goal fabric, making a slight adjustment to sett can make the collapse or folds/fulling of a fabric a success

DENSITY - this relates again to sett but also to the beat you use during weaving. A higher PPI ratio when attempting to make pleats can make a huge difference. If using shrinkage or an active yarn you may find a very light beat is required.

YARN PROPERTIES - use the properties of the yarn to your advantage - combine non shrinking with shrinking, tightly plied yarns with soft plied yarns, fine with thick

A NOTE ON FINISHING

Many weavers are apprehensive to wash a finished hand woven product. Almost every fabric should be wet finished and in most cases it is necessary to achieve the desired end result.

Wool should also be wet finished - washing methods are dependent on the type of wool and fabric. Intentional fulling is required for the purpose of collapse or lattice weaves as discussed in this presentation. Sampling is crucial - take the time to sample your weave, sett and then washing methods and water temperatures. Hand washing is highly recommended as you can observe and stop the process as needed. Master the wet finish on your samples and keep notes.

IDEAS

Deflected double weave

Honeycomb

M's and O's

Double weave horizontal pleats

The possibilities are endless!

*** See over - keep notes**

