

Designing Patterns in 3/1 Broken Twill

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1 Introduction

3/1 broken twill is a tabletweaving technique that creates a twill doublesided weave. Whilst the background is a solid colour, there are textural diagonals due to the turning motions of the cards. This creates a diagonal structure, and hence creating patterns for this technique is more challenging than creating straightforward doubleface patterns. My goal in this project is to improve my pattern designing skills.

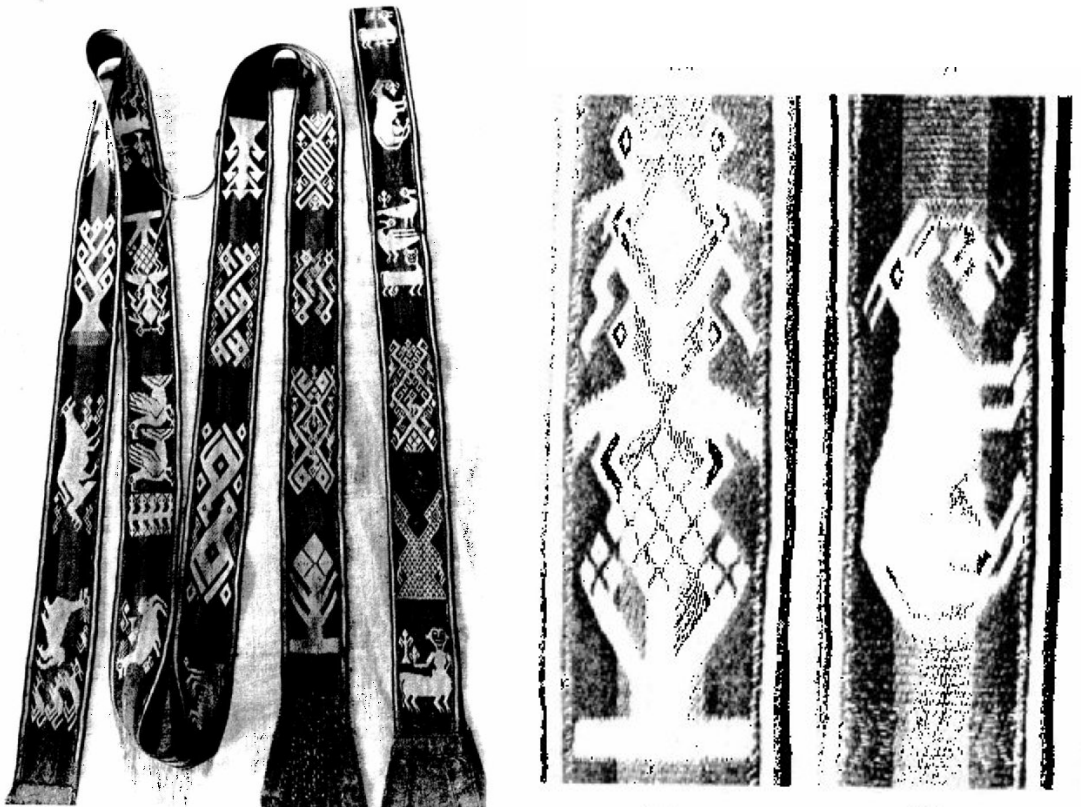


Figure 1: *St Donat's Stole, in its entirety, scanned from Collingwood, and the specific images I used for inspiration.*

St Donats' stole¹ was woven in the twelfth century using the 3/1 broken twill method for the patterned parts of the stole and plain doubleface for the background in between. The stole is described by Collingwood², and he uses the stole as an example of how he graphs patterns in broken twill. The stole is woven with a background of brown with a blue strip in the middle, and a white foreground.

I have designed two symmetrical patterns³. The patterns in the stole are not quite symmetric, but the designs I chose are particularly suited for symmetry. Included in the display are the sample pieces I used to design – and refine – the two patterns, although the final trim is woven using extra cards for a more pleasing appearance.

2 Methods and Materials

Period	Used in Project
Silk (blue, brown dyes unknown, white undyed)	Silk (blue, yellow commercial dyes)
Tablets (leather, bone, or wood)	Laminated paper cards
Unknown type of loom	Adapted box loom
Unknown pattern drafting	Brick stitch graphing paper used, all turns marked.

Figure 2: *Comparing period methods and materials to those used in this project.*

In period, the designs were woven using brown, blue, and white silk. The silk could have been dyed by the weavers but was more likely dyed elsewhere; dyed silk was commercially available in Belgium. It is not clear from either the pictures or Collingwood's description as to how many cards were used, but based on my experience the original design used at least 70 cards. They would have been woven using leather, bone, or wooden cards, on either an Oseberg type loom or a box loom. The patterns we have for period pieces have all been recreated by modern weavers⁴; the only patterns that we have documented in period are brocading patterns from Anna Neuper's Modelbuch[NSB03] in the early sixteenth century.

The silk used in this project is commercially dyed. The blue colour could have been attained using multiple baths in an indigo or woad vat, and woad was certainly available in the 12th century. Yellow can be created in a number of ways, including weld[Rou]. Silk is particularly good at absorbing colours, creating nice bright fabrics. The St Donats stole was woven in silk that was blue, white, and brown.

The loom used is a box loom – adapted from a rigid heddle loom by removing the rigid heddles. Box looms were used in period to weave longer lengths. This allows me to warp up multiple yards of warp, and weave a variety of samples. Admittedly, it does limit me in

¹Arlon, Belgium

²[Col02], p 212

³The pomegranate tree, minus the birds, was entered in Kingdom A & S in 2010.

⁴Sometimes, multiple modern weavers reconstruct the pattern in subtly different ways.

colour and number of cards, once the warp is on⁵. I used laminated⁶ cards, warped with the blue and yellow silk. The warp was first warped on a warping board and then transferred to a box loom.

2.1 Designing The Patterns

The patterns (see Patterns Appendix) were first designed on paper, with turning directions carefully penciled in, before being woven, corrected⁷, and the final pattern stored as a graphics file. Since the patterns are completely symmetric, the turning directions are displayed on only the left side – red slashes are the normal turning movements, and the blue v-shaped slashes reflect times when a card is turned while the same colour thread sits in both upper holes. Each rectangle represents two quarter turns; the rectangles are staggered to accommodate the technique as described below. The blue colour helps emphasize the special turns. These turns affect the way the edges of the design look, and getting them just right is the difference between straight edges and jagged ones. Planning out these turns – which do not result in colour changes – is one of the challenges; plotting where and how to make them requires drawing out every single turn.

The weaving is done using Collingwood’s two-pack method[Col02]. We don’t know if weavers used the two-pack method in period; however, having tried both the one and two pack methods, this method is much faster. The difference, however, between using the two pack method for twill and double face is that in the doubleface technique cards travel between the two packs when their colour changes from fore- to background or vice versa. In contrast, cards do not travel between the two packs for the twill method, and colour changes are created by turning cards along their vertical axis. However, the cards are warped identically for both the doubleface and 3/1 broken twill techniques, and since double face weaves faster, this is probably why the parts of the stole that have no pattern are woven in doubleface.

2.2 Setting Up And Weaving 3/1 Broken Twill With Two Packs

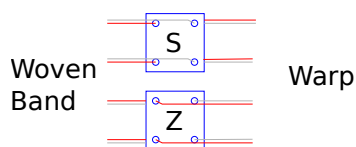


Figure 3: S and Z threading

To use the two pack method, divide the cards into an two packs, one containing the even and the other the odd cards, which both contain cards threaded alternately S and Z. The even pack starts with the background colours horizontally in the uppermost holes, while the odd starts with the background colours vertically in the holes closest to the woven part. Then the turning sequence is FF / BF / BB / FB. The cards in

Figure 3 are shown in vertical position, where each of the two colours occurs vertically on one side of the card. Turning the card vertically would result in the red and grey threads switching sides; this also switches the threading from S to Z or

⁵No changing setup until the full 18 feet is woven off. (Yes; to weave 30 inches, I brilliantly calculated I needed 6 feet of warp, and then warped 6 yards. Imperial measurements are *hard*.)

⁶Lacis, rather than playing cards. The identical cards were actual helpful rather than a hindrance for this technique.

⁷In the case of the fleur de lys, the weave, correct, reweave cycle ran quite a few times.

vice versa. The cards in the even pack can change colour in the even quarter turns, and the cards in the odd pack can change colour in the odd turns. This allows for non-jagged diagonals, if the cards in each pack are set up carefully⁸.

3 Conclusion

Compared to last year, I have become quite fast at 3/1 broken twill, and can even fix some mistakes on the fly some of the time. (If nothing else, I can unweave a lot faster now.) Nonetheless, doubleface remains a much faster technique, especially since it is possible to see from the cards alone what is happening with the weaving. In 3/1 broken twill you have to examine the threads in the cards, which is harder to do from a distance. On the other hand, the satin-like appearance is vastly satisfying to produce. As a bonus, thanks to the painstaking hours spent drawing out the card turns, I have a much better understanding of how the threading affects the weaving. For instance, the thread that travels across the top horizontal will be the colour that shows, and the direction of the resulting “stitch” will depend both on whether the thread exits the card to the left or the right towards the back of the loom, and whether the card is turned forwards or backwards. (As an example, a card whose threads travel from right to left through the card, and which is turned forward, will create a ↖, whereas turning backwards will create a ↘.)

Future work⁹ includes developing more complex (and less symmetrical) patterns. This technique was used so often¹⁰, and in so many places¹¹, that there are a large number of extant examples to provide inspiration.

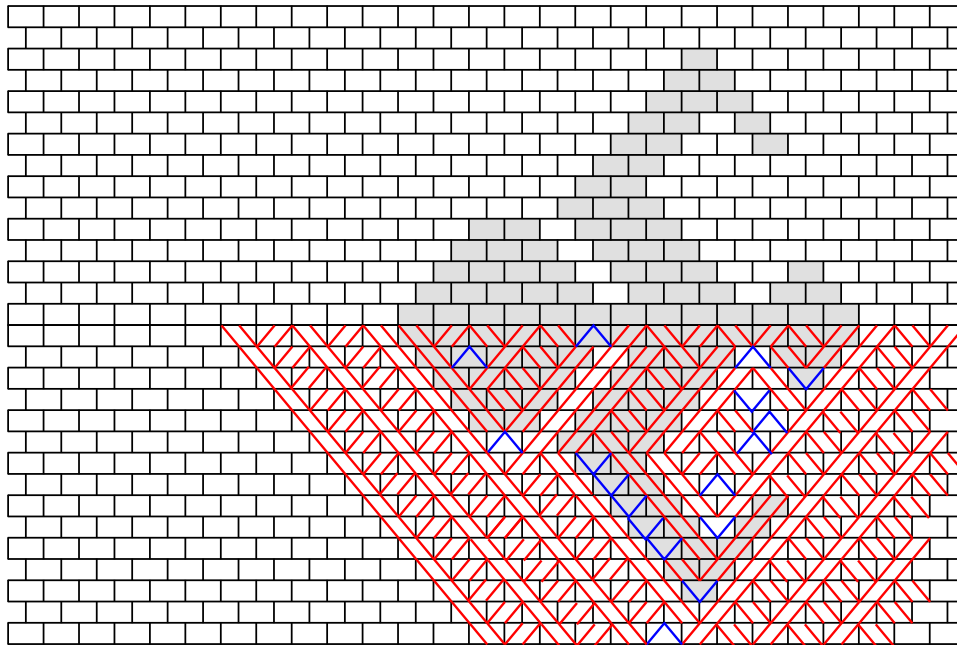
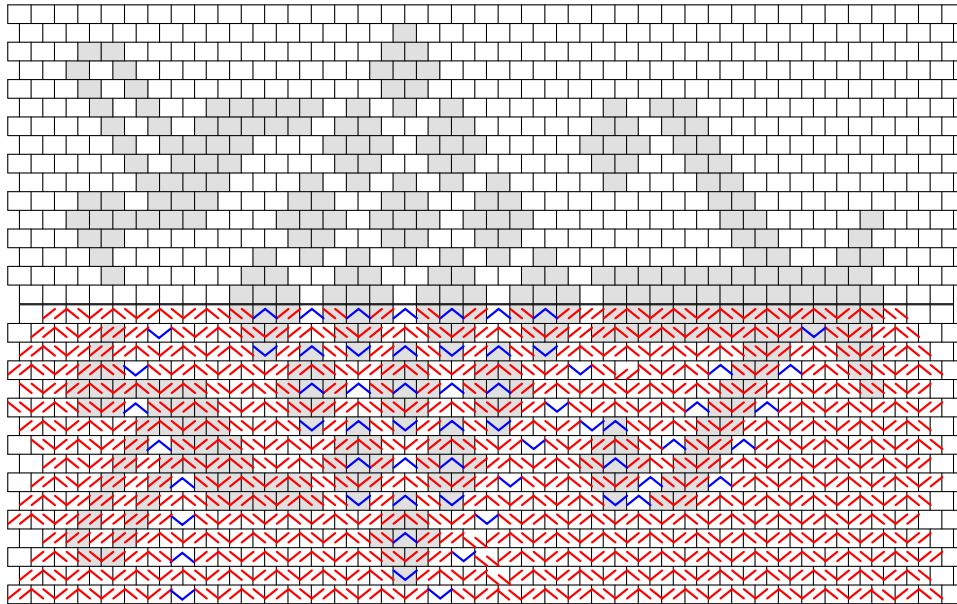
⁸And the set up varies depending on your location in the pattern; hence the occasional threading change without a colour change.

⁹Admittedly, not till after I have a chance to play with the shiny Snartemo four colour, but I am so very definitely coming back to this; this is way cool weaving.

¹⁰Collingwood cites examples from the 6th to 16th centuries.

¹¹Northern Scandinavia to southern Spain and the Byzantine empires beyond.

Appendix: Patterns



References

- [Col02] Peter Collingwood. *The Techniques of Tablet Weaving*. Robin & Russ Handweavers Inc., 2002.
- [nic] Siobhan nicDhuinnshleibhe. A brief history of dyestuffs & dyeing. <http://kws.atlantia.sca.org/dyeing.html>, last visited 1/13/2011, mundane author Heather McCloy.
- [NSB03] Anna Neuper, Nancy Spies, and Ute Bargmann. *Anna Neuper's Modelbuch: Early Sixteenth-Century Patterns for Weaving Brocaded Bands*. Arelate Studio, 2003.
- [Rou] Kateryn Rouse. An overview of period dyes. <http://sca.livingpast.com/dyes.html>, last visited 1/13/2011.
- [Spi00] Nancy Spies. *Ecclesiastical Pomp & Aristocratic Circumstance; A Thousand Years of Brocaded Tablet woven Bands*. Arelate Studio, 2000.