

Network drafting

TURNED TWILLS ON EIGHT SHAFTS

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This article is the third in a series (see part I in *HANDWOVEN*, January/February 2001, pages 46–49 and part II in *HANDWOVEN*, March/April 2001, pages 38–41). In this article we will use the same structure—turned twill—with network drafting.

Turned twill

Turned twill (also called reverse twill, twill diaper, twill blocks) is a block weave in which four thread units in both warp and weft can produce either 3/1 twill or 1/3 twill; see Figure 1. When turned twill is used in the conventional way, two blocks are possible on eight shafts, and the resulting fabric shows squares or rectangles of pattern in one twill on a background of the other. In part II, we saw how the use of color can make a chunky 2-block design look more complex, with greater visual interest. In this article, we'll see how complexity and interest can be achieved with network drafting.

Network drafting is not a weave structure. It is a system for breaking free of the block constraint to allow curves and other non-linear shapes. Network drafting can be applied to most block weaves and is especially effective with turned twill.

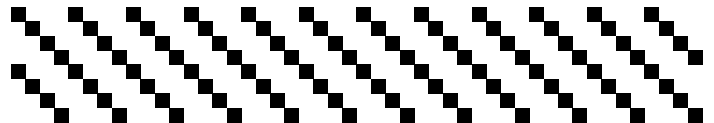


Alice Schlein, of Greenville, South Carolina, can be found weaving dishtowels when she's not weaving pictures on her TC1 jacquard loom.

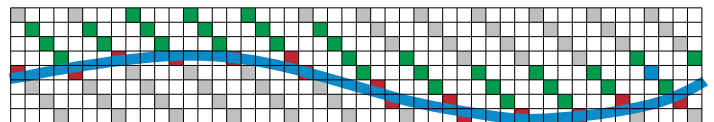
1. Two blocks of turned twill

B				A			
8				8	8	8	
7				7	7	7	
6				6	6	6	
5				5	5	5	
	4					4	4 4 4
		3				3	3 3
			2			2	2 2
				1	1		1 1 1
				/	/	/	/
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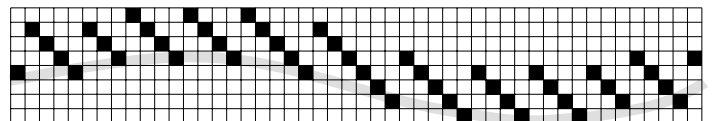
3a. A 4-end twill network



3b. A pattern line is placed on the network



3c. Hits (green) and squares (blue) above the line become the new threading

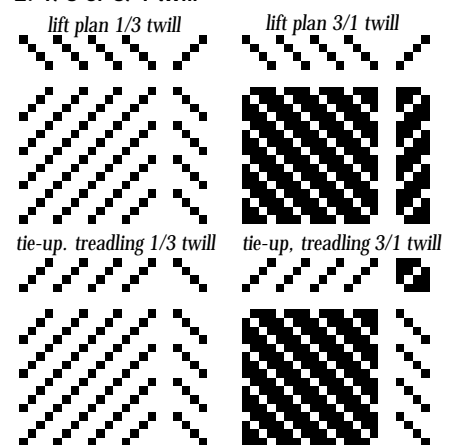


Network drafting: the initial

The most basic tool in network drafting, the initial, is the smallest amount of information necessary to define a particular weave. For 3/1 and 1/3 twills, for example, we use a 4-end initial, 1-2-3-4.

To write a draft for 3/1 or 1/3 twill for a 4-shaft loom, 1-2-3-4 is repeated in the threading as many times as necessary for the required width of the cloth. We can

2. 1/3 or 3/1 twill



then use either a tie-up and treadling or a lift plan to weave 1/3 or 3/1 twill; see Figure 2.

The threading network

On eight or more shafts, we can extend the initial and develop a threading network. A network is simply a map of the legal threading positions for any given weave. For eight shafts, repeat the 4-end



initial twice in height and as many times as desired in width; see Figure 3a. (If twelve shafts are available, the initial can be repeated three times in height; for sixteen shafts, four times, etc.) The width of the network is the total width of the threading (or threading repeat) and must be an exact repeat of the number of ends in the initial (in this case, it must be multiple of four); see Figure 3b.

The pattern line

Draw a curved pattern line on the threading network. Constrain the height of this curve to shaft 5 of an 8-shaft network (this will ensure that motifs are self-contained and do not join each other); see Figure 3b. For more information about the shaft rule and other aspects of network drafting beyond the scope of this article; see Resources.

The threading

Examine the pattern line in Figure 3b. Wherever it intersects a legal network position, i.e., wherever it crosses a filled-in square on the threading network, the square is considered a “hit”—the actual threading position for a warp thread (identified by green squares in Figure 3b; you can circle the hits on your graph paper).

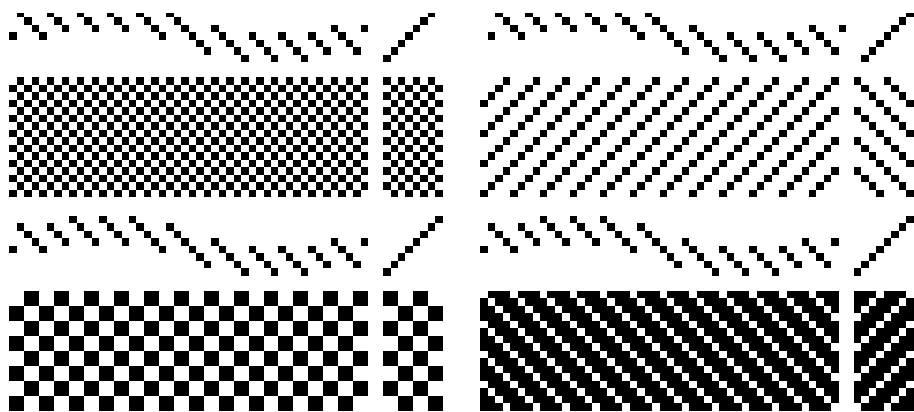
There will be a number of columns, probably the majority, in fact, with no hits. For these columns, find the next legal network position (filled-in square) above the pattern line and circle this square (identified by blue squares in Figure 3b; circle these on your graph paper). The circled squares become the final threading draft; see Figure 3c.

Since each thread in our new networked threading falls on a legal network position for 4-end twill, any structure that can be woven using the 4-end initial can also be woven on the networked threading. For example, with the networked threading in Figure 3c, we can, if we wish, weave allover plain weave, basket weave, double weave, or any of the 4-end twills; see some of these examples in Figure 4.

The as-drawn-in option

But what else can we do with our networked twill threading? A very simple

4. Several structures can be woven using a threading based on a 4-end initial



approach is to treadle as-drawn-in with any twill tie-up which shows no floats longer than three threads; see an example in Figure 6. (To weave as-drawn-in, read the threading draft but substitute the treadle for the shaft number, i.e. treadle 1 for shaft 1, treadle 2 for shaft 2, etc.)

Cut-and-paste lift plans

A more elegant solution is to cut and paste lift plans. Any two (or more) lift plans weavable on a given network can be cut and pasted together to form a lift plan weavable on any threading plotted on that network. Let’s take a lift plan for 1/3 twill, for example, and unite it surgically with a lift plan for 3/1 twill. Any size pieces may be used, but chunks from three to five squares in length and/or width will have clearer definition on eight shafts. Be sure to keep the pieces in their same relative positions in their “cut from” and “pasted to” lift plans; otherwise the net-

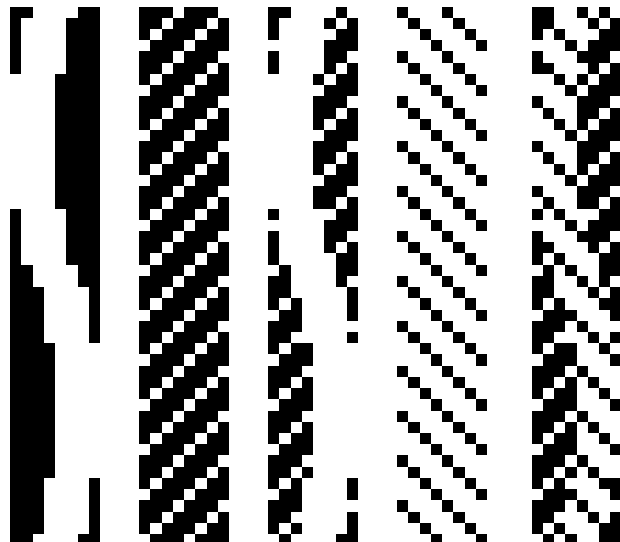
work will be disrupted. In Figure 5, chunks are cut from a 3/1 twill lift plan and pasted onto a 1/3 twill lift plan; see the resulting drawdown in Figure 7. That’s all there is to it!

Fuzzy edges

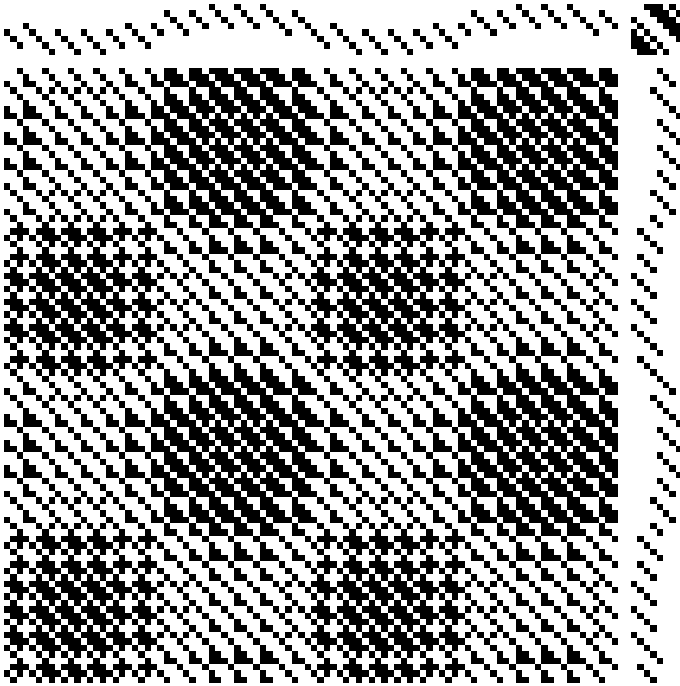
Notice that the edges of the networked designs have a blurry or saw-toothed look, unlike the clean-cut edges of block compositions. This is not to be considered a fault, but rather a natural effect of network drafting. The structure of the fabric remains sound in these edge zones—it is only the design that wanders. If you dislike the saw-toothed effect, network drafting is probably alien territory for you, and you should leave immediately and return to blockier blocks. But if, like me, you are attracted to the chaotic edge effect, then welcome to the fascinating new world of curves, illusions, and other weaving surprises—all structurally sound!

5. Cut-and-paste lift plans

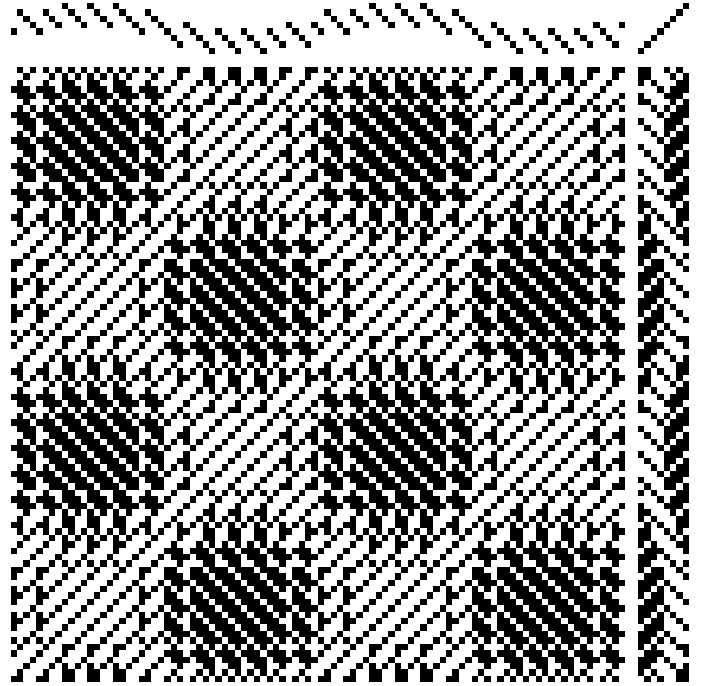
First create some curved shapes three to five squares wide. Make a 3/1 twill lift plan and use the shapes as patterns to cut sections from the lift plan. Make a 1/3 twill lift plan. Paste the sections of 3/1 twill on top of the 1/3 twill lift plan. Make sure that corresponding rows coincide (top row of cut-and-paste aligned with top row of 1/3 twill lift plan.



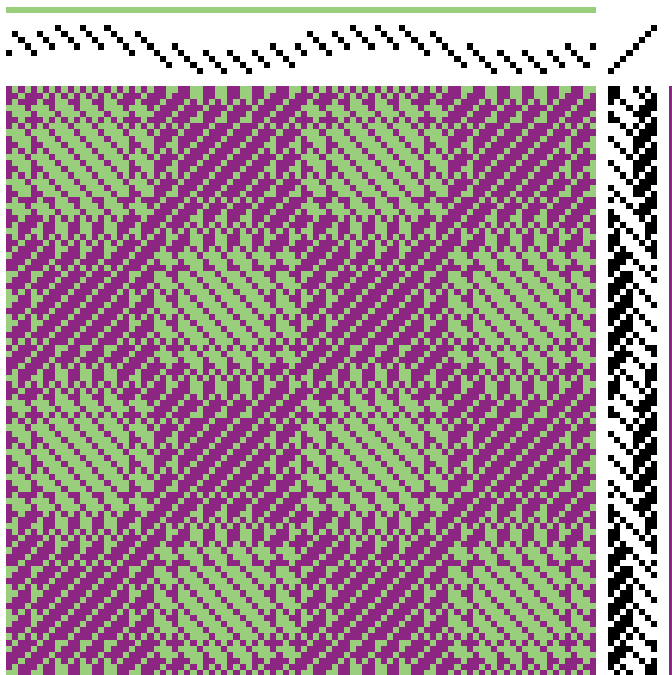
6. Networked threading draft with twill tie-up woven as-drawn-in



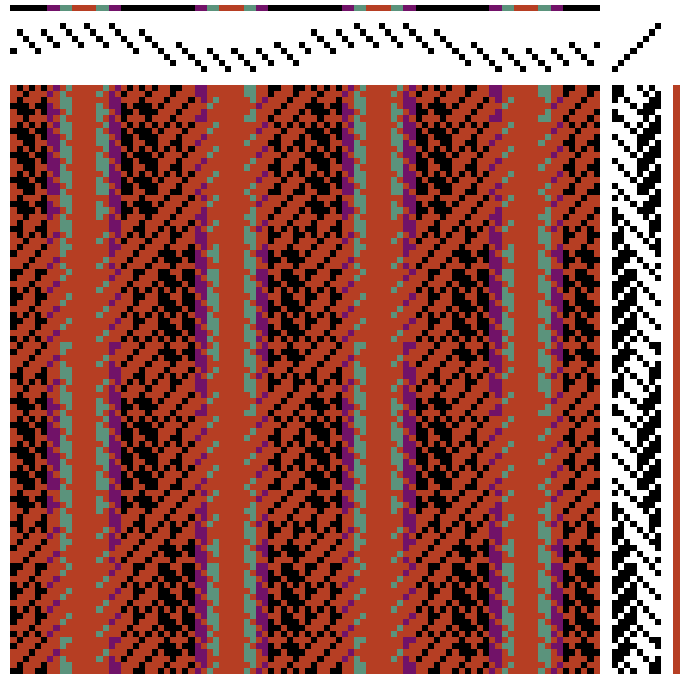
7. Networked threading draft woven with lift plan from Figure 5



8a. Draft in Figure 7 with a single color in warp and weft



8b. Draft in Figure 7 with a striped warp and a single color weft



9. Threading draft for dishtowels

a	c																D	a
	7	7	8	7	8	7	8	7	8	7	8	7	8	7	8	7	5	
	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	
	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	
																	4	
																	3	
																	2	
																	1	

Thread: 2 floating selvages (2 ends),
 c-d 1x (4 ends),
 a-d 8x (384 ends),
 a-b 1x (4 ends),
 2 floating selvages (2 ends)
 = 396 total ends.

Color effects

The new networked turned-twill draft is very effective in a single warp color crossed with a single contrasting-color weft; compare Figures 8a and 8b. Variations in color orders add greatly to the interest of twill drafts, however. The three dishtowels on page 2 are all woven on the same striped warp, each with a different single-colored weft.


Instead of emphasizing the circles, these designs give the effect of bursts of color fading in and out of the fabric where the structure changes from 1/3 to 3/1 twill and back. The color boundaries are fluid and imprecise because of the fuzzy edges of the twill areas. A visual effect similar to ikat is achieved through structure alone, without time-consuming dyeing!

The dishtowels

Wind a warp and prepare the loom following Figure 9 and Project at-a-glance. Note that the first and last two ends are floating selvages. Warp amounts are ad-

equated for 1/2-yd loom waste, a small amount for sampling, and three towels. Begin weaving with 1/2" scrap yarn in plain weave (alternately raise shafts 1-3-5-7 and 2-4-6-8). Begin and end each towel with 24 picks plain weave for hems. Follow the lift plan in Figure 10 (if you have a dobbie or table loom) or the treadling in Figure 11 (if you have a standard floor loom) for approximately 28" for each towel. Use as weft for towel A black, towel B yellow red, and towel C red.

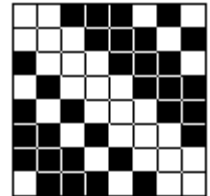
Finishing the dishtowels

Secure scrap yarn at ends of weaving with machine stitching. Machine wash with warm water and mild detergent. Machine dry on medium heat. Trim off scrap yarn and cut towels apart. Fold plain weave area at each end of each towel under twice and sew hems by hand. Steam press on cotton setting. 

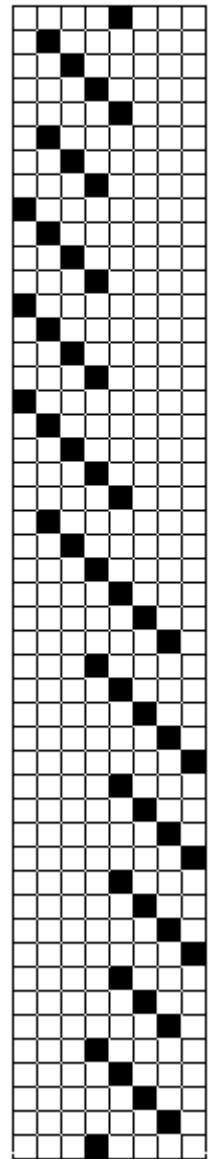
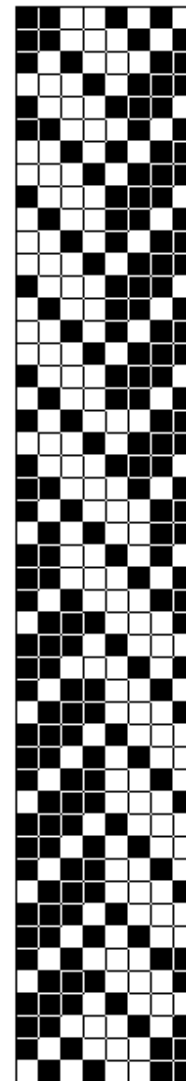
Resources

Schlein, Alice. *Network Drafting: An Introduction*. Greenville, South Carolina: Bridge-water Press, 1994.

10. Tie-up and treadling for standard floor loom



11. Lift plan for dobbie or table loom



PROJECT at-a-glance

Weave structure for towels
 Turned twill (1/3 vs 3/1 twill blocks).

Equipment
 8-shaft loom, 16 1/2" weaving width;
 12-dent reed; 1 shuttle.

Yarns
 Warp: 10/2 pearl cotton (4,200 yd/lb),
 black 3/8 oz; #10 Red 1 oz, #5 Blue
 Green 1 oz; #10 Purple 1 oz.

Weft: 10/2 pearl cotton; for Towel A,
 black 1 1/2 oz; Towel B #10 Yellow Red
 1 1/2 oz; for Towel C #10 Red 1 1/2 oz.

Yarn sources
 All yarns are courtesy of and available
 from the Lunatic Fringe.

Warp order and length
 396 ends 4 yd long in color order: [12
 black, 2 Purple, 2 Blue Green, 4 Red, 2

Blue Green, 2 Purple) 16x; 12 black.

Warp and weft spacing
 Warp: 24 epi (2/dent in a 12-dent reed).
 Width in the reed, 16 1/2". Weft: 24 ppi.

Take-up and shrinkage
 After washing, 15% in width, 14% in
 length (5% take-up, 9% shrinkage).
 Amounts provide three hemmed tow-
 els 14" x 25" each.