

# School for Weavers

## deflected doubleweave: beyond the basics

MADELYN VAN DER HOOGT

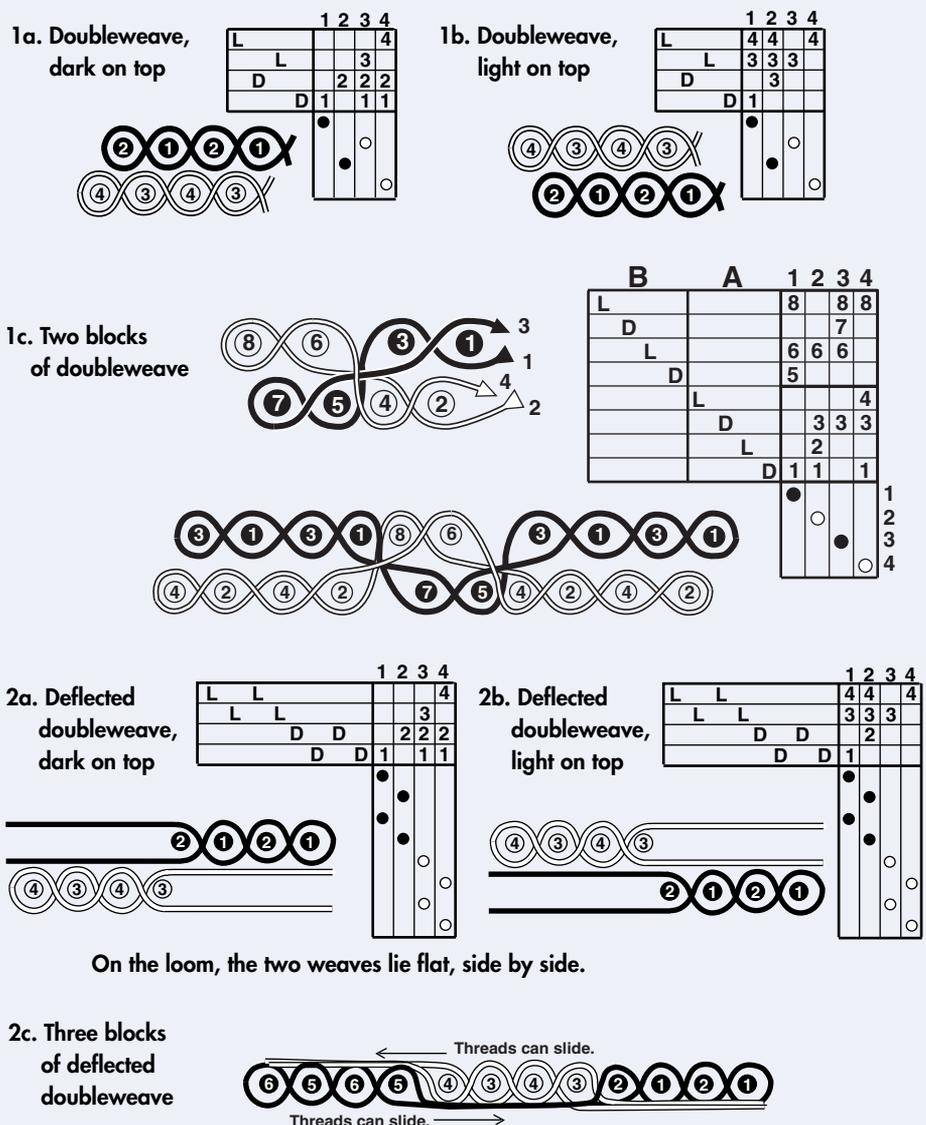
Part of this article appears in the January/February 2006 issue of *Handwoven*, pages 72–73. This website-only article is an expanded version of that article and includes a complete bibliography (page 4). Follow the steps outlined here to design and weave fabrics in deflected doubleweave with more blocks than conventional doubleweave can provide, for boldly patterned cloth with fulling, and for dimensional fabrics with differential shrinkage.

To see examples of deflected doubleweave fabrics, review the articles and projects listed in the bibliography on page 4. Then study these pages. This structure (like so many others!) is much harder to explain than it is to weave or use. The January/February 2007 article in *Handwoven* presents the bare-bones basics. If you are looking for more information, here is an expanded version of that article. It might reassure you, however, to remember that in weaving, you don't necessarily have to know why something works to use it!

### Conventional doubleweave

The word “doubleweave” identifies a single cloth in which there are actually two distinct weaves. That is, one warp weaves an interlacement with one weft, a different warp weaves an interlacement with a different weft, and the two separate structures are joined in one cloth in some way. In Figures 1a and 1b, for example, four shafts produce two plain-weave cloths, one on top of the other. If you weave the black one on top for awhile and then exchange the layers to weave the white one on top, the two plain weaves will be attached to each other where the layers exchange faces.

With eight shafts, it is possible for each set of four shafts to exchange two layers of plain weave independently. In Figure 1c, for example, shafts 1–4 weave the black layer on top while shafts 5–8 weave the white layer on top. Used in this way, doubleweave is a block weave; eight shafts provide two blocks.



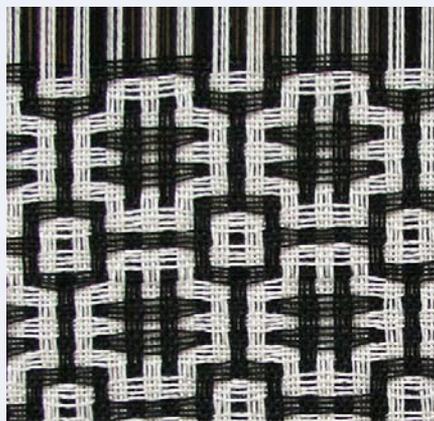
On the loom, the two weaves lie flat, side by side.

The one-and-one alternation of threads from each of the two layers in doubleweave (Figures 1a–1c) locks the threads in place; in each block the upper layer is directly above the lower layer. In deflected doubleweave, the threads from one weave float over groups of threads from the other in both warp and weft. When the cloth is removed from the loom, the threads deflect from their vertical and horizontal positions by sliding into the float areas.

## Deflected doubleweave

Examine Figure 2. *Groups* of threads from one weave alternate with *groups* from the other in both warp and weft. On the loom, the threads lie side by side in a single layer. When the fabric is removed from the loom, especially after wet finishing, the threads of each weave slide above and below each other into adjacent float areas. Where they do this, they also curve to make waves and circles. Compare the fabric on the loom in 3a with the finished fabric in 3b and notice the areas where one layer has covered the other in 3b.

3a. Deflected doubleweave on the loom

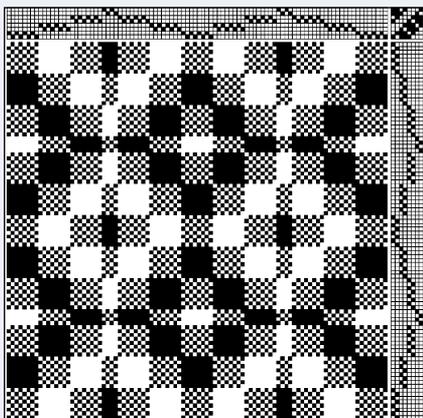


From *Handwoven*, January/February 2007, page 71.

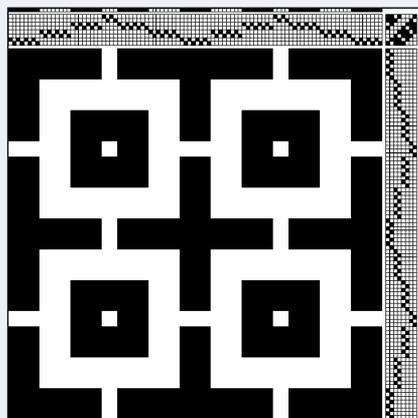
3b. Deflected doubleweave after wet finishing



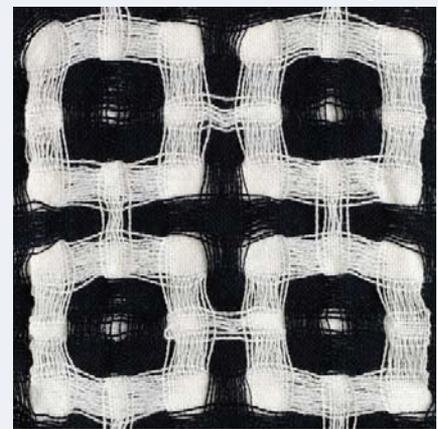
4a. Thread-by-thread draft (Stefanie Meisel scarf)



4b. Color effects of the draft in 4a



4c. Fabric from 4a before wet finishing



From *Handwoven*, January/February 2007, page 68.

## Basic principles

In conventional block doubleweave, a design shows because each of the two weaves is a different color (dark vs light, cool vs warm, etc.). This is also true of deflected doubleweave, except that instead of alternating colors within each block (DLDL in Block A in Figure 1, for example), colors alternate from block to block (DDDD in Block A, LLLL in Block B in Figure 2, for example). A dark block must always alternate with a light block.

Figure 4a gives the draft for Stefanie Meisel's scarf (*Handwoven*, January/February 2007, pages 64–67). The drawdown in 4a shows the interlacement, not the design produced by the colors. The small checkerboard areas are plain weave; the black areas are warp floats; the white areas are weft floats. A color drawdown in Figure 4b shows how the alternating dark and light colors will appear in the cloth; 4c shows the cloth itself.

5a. Tie-up for the draft in 4a and fabric in 4c (Stefanie Meisel's scarf)

D	C	B	A	1	2	3	4	5	6	7	8
○											
○											
	●										
	●	●									
		○									
			○								
				○							
					○						
						○					
							○				
								○			
									○		
										○	
											○

Dark weaves with dark (light up in D).  
 Light weaves with light (dark up in A).  
 Dark weaves with dark (light up in B).  
 Light weaves with light (dark up in C).

To see how this works, examine the tie-up for Stefanie's scarf in Figure 5a. The first two treadles weave plain weave in Blocks A and C (dark blocks). While that is happening, light warp threads in Block D are up, floating over the dark weft threads; light warp threads in Block B are floating under them. With treadles 3 and 4, Blocks B and D weave plain weave (light). Dark warp threads in Block A (shafts 1 and 2)

5b. Tie-up for fabric in 3a–3b (Madelyn van der Hoog's scarf)

D	C	B	A	1	2	3	4	5	6	7	8
○											
○											
	●										
	●	●									
		○									
			○								
				○							
					○						
						○					
							○				
								○			
									○		
										○	
											○

Dark weaves with dark (light up in B).  
 Light weaves with light (dark up in C).  
 Dark weaves with dark (light up in D).  
 Light weaves with light (dark up in A).

float over the light weft threads; dark warp threads in Block C (shafts 5 and 6) float under them. Study the rest of the treadles in 5a and the tie-up and treadling in 5b. Note that groups of dark plain-weave picks always alternate with groups of light plain-weave picks.

## Designing in the tie-up

To review: In deflected doubleweave, dark blocks alternate with light blocks in the threading; each block requires two shafts. In the tie-up and treading, picks of dark plain weave (in all dark blocks) alternate with picks of light plain weave (in all light blocks). When dark blocks weave, warp threads in light blocks float over or under dark weft floats. When light blocks weave, warp threads in dark blocks float over or under light weft floats.

The structural treading requirement of the two alternating plain weaves is the same no matter what the design. The tie-up in 6a can therefore be considered a template for deflected doubleweave on eight shafts. The design depends on which threads (of the color that is not weaving plain weave) float on top and which float on the bottom (light floats when dark weaves, dark floats when light weaves).

## 6. From thread-by-thread draft to shorthand “profile” draft

**a. tie-up template**

D	C	B	A	1	2	3	4	5	6	7	8
○						7				7	8
	○				6				6		
		●			5			5			
			○			4				4	
				●		3				3	
					2				2		
						1				1	

Dark weaves with dark.  
Light weaves with light.  
Dark weaves with dark.  
Light weaves with light.

**b. Meisel tie-up**

1	2	3	4	5	6	7	8
8	8	8				7	8
7	7	7				6	7
6				6	6	6	
5				5	5	5	
		4	4	4	4	4	
		3	3	3	3	3	
	2	2	2	2			
1	1	1					

tr 1-2: lights up in D.  
tr 3-4: darks up in A.  
tr 5-6: lights up in B.  
tr 7-8: darks up in C.

**c. van der Hoogt tie-up**

1	2	3	4	5	6	7	8
		7	8	8	8	8	8
		6	7	7	7	7	7
		5	6	6	6	6	
		4	5	5	5	5	
		3	4	4	4	4	
		2	3	3	3	3	
		1	2	2	2	2	
		1	1	1	1	1	

tr 1-2: lights up in B.  
tr 3-4: darks up in C.  
tr 5-6: lights up in D.  
tr 7-8: darks up in A.

**d. profile tie-up template**

D	C	B	A
■	■	■	■
■	■	■	■
■	■	■	■
■	■	■	■
■	■	■	■
■	■	■	■
■	■	■	■

Dark weaves with dark.  
Light weaves with light.  
Dark weaves with dark.  
Light weaves with light.

**e. Meisel profile tie-up**

D	C
■	■
■	■
■	■
■	■
■	■
■	■
■	■

col 1: lights up in D.  
col 2: darks up in A.  
col 3: lights up in B.  
col 4: darks up in C.

**f. van der Hoogt profile tie-up**

D	C
■	■
■	■
■	■
■	■
■	■
■	■
■	■

col 1: lights up in B.  
col 2: darks up in C.  
col 3: lights up in D.  
col 4: darks up in A.

## Designing with a “profile”

You can use a shorthand method to design deflected doubleweave drafts.

a. Create a draft with one square for each threading and treading block, alternating dark and light.

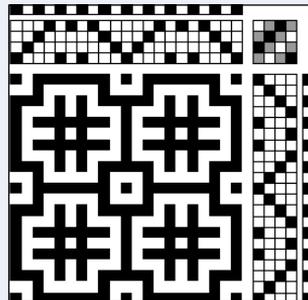
b. In the tie-up, fill in squares for the blocks that alternately weave plain weave as in Figure 6d.

c. Also in the tie-up, fill in one other square in each column—this will be the block whose warp threads will float on top.

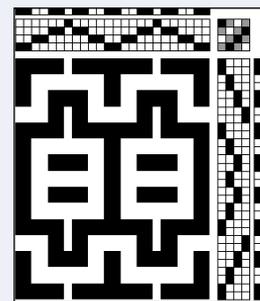
d. Then play with the treading. The only rule is that a “treadle” producing plain weave in Blocks A and C must alternate with a “treadle” producing plain weave in Blocks B and D. Be sure to choose the type of drawdown in your weaving program that shows color rather than structure.

For design ideas, you can use any 4-shaft twill draft that alternates even and odd shafts and even and odd treadles as a “profile” draft. Notice, for example, that the treading in Figure 7c uses many twill variations. Here, of course, each mark represents a single block rather than a single pick. Although the designs can give you an idea of what the fabric will look like, they do not show the deflected threads or the way one layer covers the other.

7a. “Profile” draft for 3a–3b



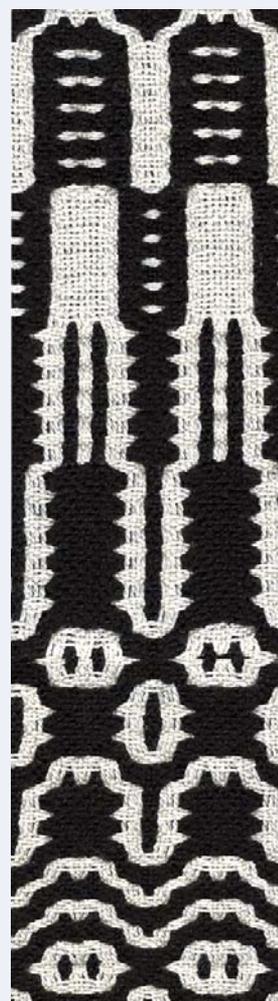
8a. Alternate treading for 4a–b



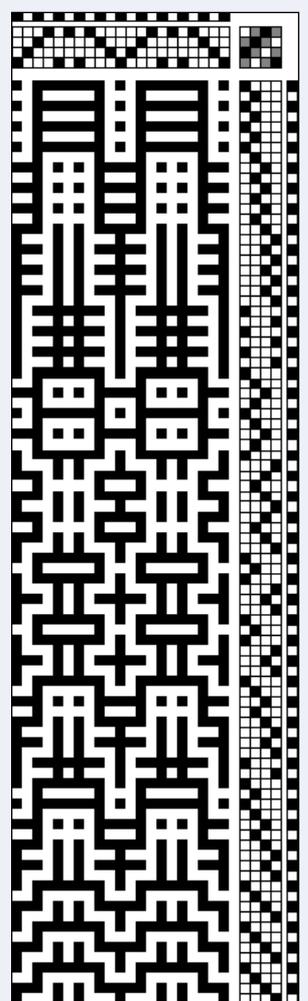
8b. Fabric woven from 8a



7b. Fabric from sections of 7c



7c. More treadings for 3a–3b



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## Fibers, setts, and shrinkage with deflected doubleweave

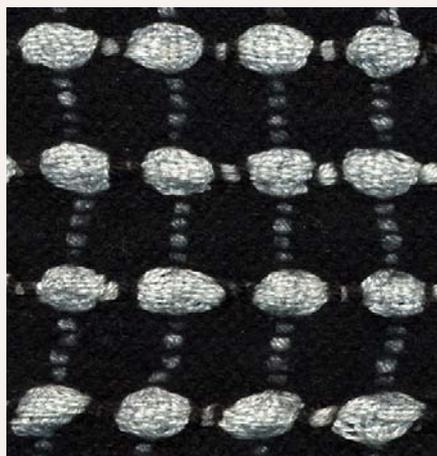
### Flat fabrics

The appropriate sett for a smooth deflected doubleweave fabric (like the fabrics in 3b and 7b) is usually somewhere between the appropriate sett of the selected fiber for a single-layer cloth and the fiber's sett for conventional doubleweave. For example, if 10/2 cotton is sett at 24 epi for a single layer of plain weave and 48 epi for doubleweave, the deflected doubleweave sett is somewhere in between, usually closer to the single layer sett (30 epi works well for 10/2 cotton). Although the fibers slide into two layers in places, they are pulled back side by side whenever their floats change from top layer to bottom or back again.

If groups of one of the weaves contain a great many threads, like the white weave in the bottom photo on this page, the overall sett should be the same as for a single layer; the two weaves cannot slide above and below each other.

### Fulled fabrics

One of the delights of deflected doubleweave is its potential for large-scale designs (compare it with shadow weave, for example). This scale can be increased by increasing the size of each block. Although



The same draft is used for both fabrics above: wool (black) and cotton (white) in the top fabric, all silk in the bottom fabric.

the floats also become longer, this is not a problem if wool yarns are used and fulled to stabilize the floats. (See Stefanie Meisel's scarf, pages 64–67 in the January/February 2007 issue and Photos 4c and 8b). Because the sticky wool inhibits the yarns from sliding into two layers, the sett should be close to that of a single layer. If you want to achieve a feltlike texture yet maintain drape, however, give the wool yarns an especially open sett so they'll have room to move yet still produce a soft hand.

### Differential shrinkage

If one of the weaves is woven in a fiber that shrinks (wool, for example), and the other in a fiber that does not (cotton, say) the wool threads will pull the cotton into dimensional puffs with wet finishing. Because the threads deflect and curve, the puffs can become round or waved—extraordinary shapes for loom-produced cloth (compare the two cloths shown here). Give the nonshrinking fiber an appropriate sett for a single layer. Reduce the number of threads in each block of the shrinking fiber and give them a very open sett. The farther apart these threads are, the more they can move during finishing to give the nonshrinking structure more dimension. 



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