

Threading Blended Overshot

1. Introduction

In her book, *Weaving Overshot*, Donna Lee Sullivan [SUL] states that any two four-shaft overshot threadings of the same length can be blended onto eight shafts. At first glance, this is counterintuitive. One would expect to need sixteen shafts because any of the four shafts of draft I could be matched with any of the four shafts of draft II. However, because of the rules of overshot drafting, the two drafts can be blended using only eight shafts. Indeed, there are only two such mappings onto eight shafts.

2. Notation

To simplify the discussion, let the digraph “ab” indicate shaft “a” from draft I and the corresponding shaft “b” of draft II. Thus the digraph 34 indicates shaft 3 of draft I and shaft 4 of draft II.

3. Analysis

Let us assume that both four block overshot drafts start on shaft 1. In our notation this would be indicated by the digraph 11. By the rules of overshot drafting, the next thread for either draft must be in twill order. That is, they must be either on shaft 2 or shaft 4. Therefore, there are four possibilities for the second thread: 22, 24, 42, and 44. In like manner, one can apply the rules of overshot and expand on these four possibilities. This is shown in table 1.

11															
22				24				42				44			
33	31	13	11	31	33	11	13	13	11	33	31	11	13	31	33

Table 1. Blending Analysis Starting With Shafts 11

Each row of the table corresponds to the next warp thread. The shaded entries indicate the first time a particular digraph appears. If the digraph appears again, it does not have to be expanded again. Further expansion of the table into the next row would provide only duplicate entries. Notice that there are eight shaded entries.

Observe that 13 appears in table 1. This would correspond to starting with shaft 1 from draft I and shaft 3 from draft II. The digraph 12 corresponding with starting with shaft 1 in draft I and shaft 2 in draft II does not appear, so we expand that combination in table 2.

12															
23				21				43				41			
34	32	14	12	32	34	12	14	14	12	34	32	12	14	32	34

Table 2. Blending Analysis Starting With Shafts 12

Again there are eight shaded entries and any further expansion would produce duplicates. Between tables 1 and 2 every starting shaft combination is accounted for as well as every transition allowed by overshot threading rules. Another way to display this is table 3.

		A		B		C		D	
		1	2	2	3	3	4	4	1
A	1	11	12	12	13	13	14	14	11
	2	21	22	22	23	23	24	24	21
B	2	21	22	22	23	23	24	24	21
	3	31	32	32	33	33	34	34	31
C	3	31	32	32	33	33	34	34	31
	4	41	42	42	43	43	44	44	41
D	4	41	42	42	43	43	44	44	41
	1	11	12	12	13	13	14	14	11

Table 3. Combined Results

In table 3, the rows are the draft I blocks and the columns are the draft II blocks. The shaded entries are the combinations we found in the analysis of table 1 and the non-shaded entries are from table 2. This makes it clear that all possible starting combinations and transition rules are covered. Table 4 summarizes the two possible mappings.

Blended Shaft	Mapping From Table 1	Mapping From Table 2
1	11	12
2	13	14
3	22	21
4	24	23
5	31	32
6	33	34
7	42	41
8	44	43

Table 4. Summary of Mappings

Thus, just by looking at the first warp thread on both drafts, one knows which mapping to use. However, depending on the original drafts, some of the eight shafts may not be used.

4. Conclusion

It is surprising that the blending any two four-shaft overshot threadings of the same length can be done on eight shafts. It is even more surprising that there are only two mappings onto the eight shafts needed to accomplish this blending. This is because the threading rules for overshot allow only twill order progression.

5. References

[SUL] Sullivan, D. L., *Weaving Overshot Redesigning the Tradition*, pg 111, Interweave Press, Loveland Colorado, 1996.

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