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I Dyed it My Way

Sylvia Emard – Weaver / Dyer / Artist / Teacher



This scarf has alternating sections of high pile (gold) and low pile (teal).

Weaving 2/1 Twill on a Rigid Heddle Loom

June 16, 2019November 3, 2020

One of the things I love about my rigid heddle loom is its simplicity. Its primary strength is its ability to make beautiful plain-weave cloth rapidly and easily.

Plain, or tabby weave, is when a weft yarn crosses over one warp yarn, under one warp yarn, across the width of the fabric, just as you would do to make a lattice pie crust. If you like to create visual interest in handwovens by varying the order of colors and textures of yarn, and complete a project in less than a day, you can hardly do better than to warp and weave on a rigid heddle loom.

I weave with double heddles for a double-density sett with finer yarns on my loom, but I still am weaving plain weave. Both heddles go up for one shed, both heddles go down for the other shed. But after producing dozens of plain-weave scarves, table runners, pillow covers, etc., the thought comes creeping: “What other structures might I be able to create on this loom?”

My library of weaving books and videos is full of advice on how to make a rigid heddle loom act like a 4-shaft loom, but the process always seems so complicated! Weave with 3 heddles, or use multiple pick-up sticks, or add heddle rods. If I want to do a complicated weave structure, I have floor looms for that. I want an alternate weave structure I can create with just the two heddles I already use.

After poking around on the internet, I found an answer: twill weave, but specifically 2/1 twill. The salient feature of twill is its pronounced diagonal lines created by small floats of yarn crossing over two or three yarns in the web. Having first learned to weave on floor looms with a number of shafts that are multiples of 4, I tend to think of twill as a balanced 2/2 twill or an uneven 3/1 – 1/3 twill. A 2/2 twill means a weft thread goes over two warp yarns, under two warp yarns, with each new row offset by one warp thread. A 2/2 twill looks the same on both sides of the fabric and the diagonal lines form a 45° angle.

Denim, used for blue jeans, is typically woven in a 3/1 twill, whereby a weft thread crosses over 3 warp threads, under one warp thread on one side of the fabric. The other side of the fabric is a 1/3 twill, with the weft crossing under 3 warp threads, over one warp thread. Denim is made with indigo-dyed warp and white weft, so the two sides of the fabric look different. The “right” side shows more indigo warp floats, the “wrong” side shows more white weft floats, and the diagonal lines frequently form a 30° angle.



Now, back to the 2/1 twill that can be woven on the rigid heddle loom with only two heddles and no pick-up sticks or heddle rods. With the help of my internet sources and some mental gymnastics performed during wakeful hours late at night, I realized I could thread the loom at 1.5 times the density of a single heddle in a 2/1 threading. One third of the warp threads go through the holes of one heddle, another third go through the holes of the second heddle, and the final third of warp threads go through the slots of both heddles. Any shed made with this threading is always 2 against one – plain weave is not possible with this threading.

This picture shows the three groups of warp threads. Top layer goes through holes in back heddle, slots in front heddle. Middle layer is threads in slots on both heddles. Lower layer is threads in slots on back heddle, holes in front heddle. Each shed is made by opening one layer away from the other two.

This 2/1 twill is woven in a 3-heddle sequence: 1) one heddle up, the other in neutral, 2) the second heddle up, the first in neutral, 3) both heddles down, making the loom act like a 3-shaft loom. This fabric is weft-dominant on one side and warp dominant on the other, just like the denim fabric, but with the diagonal lines forming a 60° angle.



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I wove a scarf with the weft-dominant side facing up on the loom, warp-dominant side facing down for the whole length of the project. The two sides of the fabric appear quite different from each other. Next, I wove a scarf with alternating sections of weft-dominance and warp-dominance. To achieve the alternating pattern, I modified the 3-heddle sequence to 1) one heddle down, the other in neutral, 2) the second heddle down, the first in neutral, 3) both heddles up. I also reversed the sequence to get a zig-zag pattern of diagonal lines.



The scarves pictured above were woven with a straight twill threading, i.e., 1-2-3-1-2-3. I wanted to see if I could thread the warp in a point twill: 1-2-3-2-1. The answer is Yes! I wove the scarf below with one 3-heddle sequence to achieve a pattern of diamonds on the weft-dominant side (blue) and another sequence at the opposite end of the scarf which created little elongated ovals on the warp-dominant side (red).

This scarf is woven with a point twill threading.



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The lesson learned is that the versatile rigid heddle loom can do more than one simple weave structure. Let's hear it for twill!

[rigid heddle](#) [twill](#) [weaving](#)



Published by weaverdyer

Weaver, dyer, textile artist. My interests are shibori and surface design on fabric. [View all posts by weaverdyer](#)

9 thoughts on “Weaving 2/1 Twill on a Rigid Heddle Loom”

JR says:

August 6, 2020 at 12:34 pm

I love your description here on 2/1 twill for rigid heddle, using it I was able to replicate warp and weft facing 2/1 twill in a weaving tool I created online.

But no matter what I do I can't quite wrap my head around point twill. It sounds like...you change the way you thread your warp through the two heddles? Instead of changing the order of the sheds you create? Could you clarify so I can figure it out enough to run tests?

Reply

weaverdyer says:

August 8, 2020 at 11:35 am

I have added a point twill threading diagram for two heddles in the original post. It has been a while, but I think the heddle sequence was Heddle 1 Up, Both heddles Down, Heddle 2 UP, Both heddles Down. Play around with variations in your online tool; you'll undoubtedly get some interesting patterns!

Reply

JR says:

August 8, 2020 at 4:50 pm

Thank you so much! (I think this is the email I originally commented with)

Would you mind posting a similar diagram for the non point twill? I'm trying to wrap my head around...What exactly is changing between the two?

At first I'd thought "1,2,3,2,1" meant the order of the the threads themselves, so with your diagram I see that's not the case. With my online tool I figured out that its the order of when things go up vs when they go down. It...LOOKS like your diagram is saying its whether a thread veers left or right between the two heddles?

I'm literally warping my first twill test as we speak, so maybe I'll figure it out by doing. I really do appreciate your resource, you're the first one to actually make 2/1 twills “click” for me!

JR says:

August 9, 2020 at 12:35 pm

I think I figured out point weaving, your diagram plus trying it out physically was a huge help!

Thanks again!

miriam kaufman says:

March 17, 2021 at 6:57 pm

Thanks for this post, a question (I'm pretty new to double heddle)

Do I warp twice into each slot on back heddle, then cut and alternate too, middle lower?

Is there a need to make the total number of ends a multiple of three?

Thanks!

Reply

weaverdyeer says:

March 18, 2021 at 3:37 pm

For weaving 2/1 twill with two heddles, you want to set your warp at 1.5 times density, rather than double density. When you warp, you will draw one loop through the first slot, then two loops through the next. Here is a link to a great explanation and diagram:

<https://matildalazouche.livejournal.com/5012.html>. Thanks Matilda, I couldn't have said it better myself! Your total number of warp ends does not need to be a multiple of 3. Hope this helps!

Reply

Rachel says:

June 7, 2022 at 11:21 am

I know this is an old post, but is there a way to use a pick up stick for the back heddle? My loom only has space for one. Would I just put the stick "under" wherever a thread would go through a hole in the back? And over wherever it would go through a slot?

Reply

weaverdyeer says:

June 8, 2022 at 10:05 am

You certainly could use a pick up stick or a heddle rod to create an additional shed. You could even use another heddle or two, hanging in front of, or behind the single heddle you use now, even without a two-heddle block on your loom. The thing to remember is that one of the sheds your heddle creates is made by "lifting" the slot threads above the "working" threads (in the holes) by pushing the heddle down. If you can't make a shed by pushing a heddle down, you will need a way to lift those non-working threads, by stick, heddle rod, etc. By all means, experiment and see what you can do!

Reply

Rebecca says:

July 13, 2022 at 10:48 am

Thank you SO much for writing this post. I too have been trying to learn the three and four shaft modifications for a rigid heddle loom, but have been quite perplexed. Your post demystifies it almost completely and I am so excited to finally try it.

Reply