Design Sources: The Edges of Fiber Geometry

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My investigation began with the analysis of the stitched geometrical patterns used in the Japanese textile tradition called sashiko. This technique requires only needle, thread and countless hours of patient stitching. I became intrigued with the hemp leaf pattern called asa-no-ha. The crossing white stitches on a field of deep indigo blue, conjured up memories of starry constellations and the pinpoint, accurate mapping of laser surgery. When I look from one star to another, the stars seem to twinkle. I believe this illusion happens because the stars share rays. Looking at one star’s center invariably decomposes its neighbors.

Upon close scrutiny I discovered that the hemp leaf lattice is built from overlays of three sets of parallel solid lines with three sets of parallel broken lines. When I combined the just the solid parallel lines, the Japanese fish scale pattern emerged.
When I stacked the three sets of broken parallel lines, the baby block pattern popped out.

In playing with the hemp leaf lattice, I discovered it contained a wealth of shapes and small motifs within its wire frame. Even coloring only black and white produced many pleasing variations. Eventually I chose to highlight the six-pointed star shape. When I aligned the stars in ranks and files, long hexagons and small diamonds made up the leftover, negative space.

When I offset the stars, a ring of tumbling blocks appeared around each star.
When I gave each offset star a halo, hexagons emerged and the negative spaces became triangles. With simple shading, using three values, the triangle could be read as a pyramid with a triangular base.

How to translate this design into a weaving for a Jacquard loom? All woven cloth is made by interlacing warps and wefts. There are no real diagonal lines: with every pass of the weft shuttle, each warp must be positioned either above or below it. To create the illusion of diagonal lines, the weaver carefully makes a step pattern in the weave that mimics the desired slope. The eye blurs the jagged steps and at a distance, one sees diagonal lines.

I had my fish scale lattice of the solid parallel lines and my baby block lattice of the broken parallel lines. Now I needed to discover the step pattern that would make the diagonal lines appear. After much trial-and-error, I found the sequence. For the fish scale lattice, the slope required four single steps then one double step.
For the baby-block lattice, the diagonal lines needed a much more gradual slope. One square up and two over followed by one up and three over did the trick. The challenge was not only to determine the correct slopes to make the diagonal lines, but to make the lines intersect each other at precise points. Even one square off would destroy the illusion.

Once I superimposed the fish scale and the baby-block lattices, I had my hemp leaf lattice ready for coloring. I wanted this design to become a silk velvet. I had to determine which shapes would be the velvet pile and which shapes would be voids, the ground, the areas without pile. I had to decide if the pile would be uncut and appear as tiny light-colored loops or if it would be cut and become dark tufts of color. Also I had a choice of pile color, either blue grey or a mix of plum and gold.

The final plan had the stars in blue-grey pile. One type of star contrasted the more pearly uncut pile with fully cut pile. The other type juxtaposed the uncut pile with demi-cut pile where every other warp pile is cut. On this point-paper design every square indicates the plan for a single pile warp.

The halo around each star showed the ground weave, and the triangle shapes were pile areas subdivided into three smaller isosceles triangles with a common apex. One sub-triangle was
uncut, one was cut and one was a mix of cut and uncut. Since triangles were made from
alternating plum and gold pile threads, the uncut portions and the all cut portions were a mix of
plum and gold, but the demi-cut areas were either all plum or gold.

My velvets are visual metaphors for my life. I see my life as a tessellated surface. Everything
matters, waking and sleeping, conscious and subconscious. Elements fluctuate bringing some to
the forefront for a time while others recede. I strive for balance and harmony on a tantalizing,
patterned plane.