1988

The Validity Of Studies Of Pattern And Structure: Case Histories

Milton Sonday
Cooper-Hewitt Museum

THE VALIDITY OF STUDIES OF PATTERN AND STRUCTURE: CASE HISTORIES

Milton Sonday, Curator of Textiles
Cooper-Hewitt Museum
2 East 91st Street
New York, N.Y. 10128

The importance of the analysis of continuous pattern and detailed recordings of the structures of lampas and velvet was driven home to me during my work on the Textile Museum's Safavid project. This resulted in "Pattern and Weaves, Safavid Lampas and Velvet" pp. 57-83 in the catalogue Woven from the Soul, Spun from the Heart published by The Textile Museum, Bier (1987). Practically anyone with a minimum knowledge of Iranian Safavid art and design of the 16th and 17th centuries can recognize a standard Safavid-style lampas and velvet because of motif. Therefore, why go any farther? Perhaps you don't, but if you do go far enough, you might glimpse and confirm a historian's description of an industry, the underlying aesthetic values of a certain workshop, period or movement and even the general far reaching characteristics of a culture. Studies of pattern and structure helped put the various silks called Safavid into a reasonable date sequence. I direct your attention to work now being carried on by Mary McWilliams.

Narrative content is one of the most striking features of many Safavid patterns of the 16th and early 17th centuries. Such patterns are alive with screaming birds, realistic hunting scenes and melancholic love stories. Refer to Bier (1987).

Most Safavid patterns do not have sweeping flowing movements. Compared with patterns from other cultures, they seem to lack dynamic rhythms which flow from one motif to another and lead your eye smoothly and quickly up and down the length.

It wasn't until I saw a number of Safavid patterns reconstructed as continuous lengths and then analyzed their repeats that I began to understand and appreciate their unique qualities. Safavid patterns are evenly and strongly punctuated. Motifs are most often repeated in offset positions. Your eye remains fixed on one area or motif then moves to another to be fixed again for the same amount of time and on, again and again, at an even cadence. Speaking for myself, my eye is distracted too long by an event thereby weakening the underlying rhythm of the continuous composition.

Very few Safavid silks are vertically symmetrical nor is a grid such as the ogee used very often. Bier (1987) Cat. No. 36 is now dated late 15th or early 16th century. This silk has both vertical and horizontal mechanical axes of symmetry, a combination which is very rare indeed. Since the medallions defined by the ogee lattice are stronger than the lattice itself, we focus on the offset position of the medallions.

These velvets, Bier (1987) fig. 8b, p. 68 and Spuhler (1978) Pl. 178, pieces of which are in various collections, are symmetrical on vertical axes and have ogee movements. The large blossoms dominate and create their own rhythms. As seen in the reconstruction in Bier (1987) p.68, the underlying curved back vine breaks the impact of the ogee grid. Safavid designers were masters at designs with superimposed levels - more so in rugs than in silks.

Not many designers have been able to break the combined powerful forces of the ogee and axes of symmetry. They are broken in these velvets by having large blossoms on the apex of the ogee shape

and smaller blossoms on the grid itself and by adding counter movements with vines on a different level. The grid in the reconstruction is strong, but it's strength was countered by the large blossoms and the underlying vine as I've already pointed out. Both these patterns have mechanical axes of vertical symmetry.

The pattern of this velvet, Bier (1987) Cat. No.9, Figs. 9a,b,c, pp. 70-71, is, in my opinion, particularly successful. It does not have mechanical vertical axes of symmetry. See my analysis of it in the Textile Museum's Safavid catalogue.

In this velvet, Bier (1987) Cat. No. 35, there is a very clever ambiguity between ogees, circles and hexagons. There are no mechanical axes of vertical symmetry. The symmetrical axes are visual and softened by the delicate flowering tree and the action of the falconer. Once we spot the lion face in the fan-shaped leaf and the dragon in the lancet-shaped leaf, movement is temporarily arrested. This is one of the best examples of sophisticated Safavid pattern.

Compare Safavid multi-level ogee type patterns with a 16th c. Italian or Spanish lampas and a 16th c. Turkish velvet. While there are similarities, national identity is fairly clear.

The hunting scene patterning this velvet, Bier (1987) Cat. No.34, has two different hunters on horseback: one facing left, the other facing right. They are offset within the technical repeat unit of the straight repeat. In the continuous pattern the two hunters lead your eye in a zig-zag fashion - one movement countered by another.

The scene showing Shirin bathing, Bier (1987) Cat. No. 29, is repeated in offset positions, but with all the motifs facing the same direction. The two positions of the same scene together make up the technical repeat unit of the straight repeat.

The repeat system most often used by 16th century Safavid designers is this as I illustrated it in the Textile Museum's catalogue. See: Bier (1987) Figs. 3a,b,c,d, pp. 62-63.

Fig. 3a shows the scene with motifs composed as a painter might sketch them. This is the basic visual unit.

Fig. 3b is the visual unit squared off. There are several points to note: What is cut off on one side is completed on the other; the dialogue between the hero and dragon takes place on one side of the unit and the delicate tree on on the other; one bird directs our attention to the dragon creating a circular movement while the other bird leads our attention out of the unit.

In Fig. 3c we see two visual units one above the other. One is a mirror image of the other. I am now calling this placement of two mirror images a revolved imaging. Imagine the central axis of a revolving door, here marked center line or the axis of the revolution. These two visual units together make up the technical repeat unit of a straight repeat. Now the top and bottom of this composite unit will match. Two hunters and their dragon are in offset positions.

Fig. 3d shows the continuous pattern represented as a length, three repeat units wide. Note the circular path the eye takes as it is lead through the design.

Safavid designers did not invent this repeat system, but they certainly favored it. Revolving a unit has a clever economy. Only one squared unit would have to have been carefully drawn so edges meet when the same unit is revolved and placed above or below. Thus, one carefully composed unit can be made to appear twice as large by placing two revolved units end to end.

I would imagine this sort of economy would appeal to a

designer primarily interested in the narrative content contained within a visual repeat unit as the Safavids seem to have been.

The reconstruction of the continuous pattern of the famous tent ceiling in the Museum of Fine Arts in Boston, Bier (1987) Cat. No. 30, gives you some idea of the back and forth diagonal movements among the large rock formations.

The pattern with fishermen, Bier (1987) Cat. No. 24, once again tells a story. There is practically nothing leading you from one horizontal stream to another.

A layout using two revolved units would also appeal to designers working in a highly competitive industry with increasingly rapid seasonal changes in patterns as was the case in Europe in the 18th century. Relatively simple revolved duplication can be considered a time-saver.

Referring to a French point paper or mise en carte of the second half of the 18th century in the Collection of the Cooper-Hewitt Museum (C.H.M. 1939-21-10), what is carefully worked in color is the visual repeat unit. You can see how the ribbons connect and continue curving when revolved units are placed end to end. Once the connections were carefully worked out in one visual unit, as shown here, it would have been a relatively simple procedure to revolve a second and make the pattern tie-up for the then complete technical repeat unit. Referring to a Spitalfields silk of the 1740's in the Collection of the Cooper-Hewitt Museum (C.H.M. 1955-162-2), there is one repeat unit within the selvedge to selvedge width. The French pattern would have had two units within the width.

Referring to Spuhler (1978) No. 107, this pattern has a technical repeat unit which was mechanically mirror imaged on a central vertical axis. The technical repeat unit is made up of two revolved visual units. The same layout was used for Bier (1987) Cat. No. 10 and Fig. 8b, p.68.

A black and white reconstruction of a pattern does not illustrate the effects of color and value. In both lampas and velvet weaving, the colors of major motifs were often changed to create counter color rhythms. In lampas this could be done by simple changes of wefts of the supplementary weave in bands. The Safavids seem to have invented a special method for velvet - that is, laborious pile warp substitution. This was done also in India, but as far as I know, no where else.

Once I understood how typical 16th century Safavid continuous patterns were organized, their static nature and the consistency of their technical details, which I will summarize later, seemed to me to reflect a tightly controlled industry whose products were made for consumption only within Iran. Lampas and velvets were extremely well woven and popular in the 16th and early 17th centuries.

Patterns and colors begin to change in the 17th century as did all aspects of Safavid culture. The change is illustrated by comparing the 16th century lampas, Bier (1987) Cat. No. 1, with the completely weft faced weave, Bier (1987) Cat. Nos. 17 & 18. Lampas and velvet were increasingly less often used. Motifs became more delicately colored and outlined by a contrasting color instead of dark brown or black. Patterns became primarily floral, no longer narrative, and were set off against gold and silver backgrounds. Up to now only velvets were woven with metallic backgrounds. Various structures evolved which are completely weft faced.

The considerable changes which took place in Iran from the 17th to 20th centuries have interesting parallels in design,

administration and economics. Here are two late 19th or early 20th century silks based on Safavid themes: Pope (1981) Pls. 1029, 1058. The patterns, colors and structures are wrong for the 16th and early 17th centuries. Never mind that the silk in Pl. 1029 has a date woven in translated as "1571".

This brief, somewhat personalized view gives you some idea of the insights of a culture which can be gained by a study of the aesthetics of that culture's patterns and repeat systems.

In the area of woven fabrics, there are a few generalizations which textile historians quickly acknowledge. One of them is the transition from the warp oriented compound weave with inner wefts, Burnham (1980) p. 172, to the weft oriented compound weave with inner warps, Burnham (1980) p. 180, top diagram. Both these examples are plain weave. One is a 180 degree rotation of the other.

In Chinese silk weaving, the warp oriented weave is associated with the H'an Dynasty and the weft oriented weave with the T'ang Dynasty. In a few instances, designs are similar in both weaves. How and why the change from warp to weft orientation took place are intriguing questions.

Referring to Shosoin (1963) Nos. 32 & 33, both these silks are preserved in the Shosoin in Japan which contains silks of the 7th and 8th centuries. The warp version of the structure is No. 33, the weft version is No. 32. There are similar questions to be asked concerning these weaves of the Eastern Mediterranean.

The weft oriented weave with inner warps in a plain weave is called "taqueté" in French. Best known are the Eastern Mediterranean wools of about the 3rd or 4th century which Mr. Homossani will have something to say about later.

The twill version of the weft oriented weave with inner warps is called "samit" in French, Burnham (1980) p. 180, lower diagram. Samit is particularly important for anyone working with early silks from Japan to Spain for it was the most often used structure for multicolored figured silks up to the 14th century. There are numerous studies of silks of this structure preserved in Europe published in CIETA Bulletins. I must also point out Mr. Vial's contributions to Tissus de Touen-Houang, 1970.

The emergence of lampas is another fascinating transition, one which has attracted less attention than the appearance of taqueté and samit. See: Burnham (1980) p. 82 and Bier (1987) p. 72-76. Lampas (a French term - the British-English term is tissue) can be glimpsed as early as the 11th century. I would refer you to the work of Regula Schorta on silks preserved in the cathedral in Bamberg.

Lampas was the most often used structure for multicolored figured silks from the 14th through 17th centuries and is the structure I am working on now.

A lampas has a foundation weave to which is added another weave - a supplementary weave. The foundation weave is always warp oriented and occupies a middle plain in relation to the wefts of the supplementary weave. Referring to a 14th c. Italian silk: here the foundation weave is plain weave. The supplementary weave is weft oriented, here a plain weave. It is the wefts of this weave which are either on the front or back of the foundation weave. Therefore, the front of a lampas has a contrast between the warp orientation of the foundation and the weft orientation of the supplementary weave. The technical details of a lampas which are useful for comparative analysis can be shown using 16th century Safavid silks as examples. See discussion in Bier (1987) pp. 72-76 and diagram p. 138.

In a typical 16th century Safavid silk lampas, the foundation

weave is 4&1 satin and the supplementary weave a 1&3 twill. While relatively few survive, the detailed relationship between the warps and wefts of each weave are remarkably similar in most of the Safavid lampas I've studied. Such uniformity again points to a centrally controlled industry. For those of you who are interested, the details to note are these:

twill interlaced connection holding the two structures together.
warp order: 5 foundation warps (those which are yellow) to 1 supplementary warp (those which are pink)
weft order: foundation weft 1st, those of the supplementary shed 2nd.
warp pattern step: 7 foundation warps (only the yellow warps)
weft pattern step: the wefts of 2 consecutive sheds of the supplementary weave
discontinuous supplementary wefts are in the same shed as those which are continuous, not shown

Consistence in structure can be found also in Safavid velvets of the 16th and 17th centuries, although there is some variation in surfaces.

Since so many aspects of fabric analysis are new to us, it is often difficult to know where to begin or what is most important to record. In the case of woven structures, everything having to do with the warp is most important - particularly for drawloom woven figured patterns. It is the warp, after all, which must be lifted and often lowered to produce the shed for various wefts. Once a warp is put onto a loom, it is likely to remain on the loom in the same density and order for quite some time. This is standard practice in any production workshop. Many different patterns could be woven on the same warp. Even colors of the warp can be changed without changing warp density and order.

One of the most fascinating features concerning the warp is pattern step and the calculation of the proportion of the pattern grid.

The patterns of all woven fabrics, from a simple twill to a complex figure, conform to the grid created by warps and wefts. The diagonal in a simple twill is based on steps of one warp and weft. If the angle of a twill is 45 degrees, the grid or proportion between warp and weft is square. Proportion depends on such things as warp size, warp sett, tension, size of weft and force of beating in wefts.

Bier (1987) Cat. No. 1 happens to be the first figured silk I studied when I worked in the Textile Museum. Louisa Bellinger asked me to draw the structure. It took me months! Her work is not appreciated as much as it should be. The silk would have been woven face down. Therefore, a draft showing the coordination between the two harnesses of the drawloom - the pattern draw section and the lifting and lowering shafts for the structure - would show the back. Preparing a theoretical draft is an important step in the analysis of a woven fabric.

In a complex figured weave, such as a lampas, a weft from the supplementary weft shed is forced to the back or front of the foundation weave by pulling up foundation warps. The smallest number of warps pulled is the warp pattern step. This can be a single foundation warp or, as in the diagram of a Safavid lampas in Bier (1987) p. 138, 7 foundation warps, only the ones colored yellow. Wider steps are multiples of this number.

The weft pattern step in this diagram is two: two repeats of the pattern selection from two consecutive sheds of the supplementary

twill weave.

In the Safavid fabric diagramed, a warp pattern step of 7 and a weft pattern step of 2 results in a square grid.

One can imagine that the grid paper used was made of squares, as in the bird's head in Bier (1987) p. 73. Diagram 10c shows 15 warp pattern steps or squares per centimeter across and 15 weft pattern steps or squares per centimeter up and down. The heavy lines indicate a centimeter.

Such counts tell us something about the quality of the drawing of the pattern. This silk has very high warp and weft counts, yet the pattern is somewhat coarse. Look at the curves. Imagine what this same pattern might look like with a warp pattern step of 3 or 4 and a weft pattern step of 1. (The same bird's head was shown re-drawn with 30 warp pattern steps per centimeter by 30 weft pattern steps per centimeter resulting in a head twice as fine, but not as bold.)

Thus, it is the contrast between warp and weft counts and pattern step counts which are more important than the counts of warps and weftes alone. Fine, sturdy, high quality fabric with bold patterns capable of being read at some distance reflect the self assurance and authority of the Safavid state. For example, Mary McWilliams has recently pointed out the propaganda value of the prisoner scenes, McWilliams (1988).

Pattern grids are not always square. The bird's head was shown re-drawn with 15 warp pattern steps by 30 weft pattern steps per centimeter, forming a grid of horizontal rectangles. The bird's head was shown re-drawn with 30 warp pattern steps by 15 weft pattern steps per centimeter, forming a grid of vertical rectangles.

The effects of the proportions of the pattern step grid on various patterns were illustrated with various fabrics and 18th century French point papers.

No matter what aspect of fabrics you are studying, technical analysis can be useful. We are, for the most part dealing with a production industry in which technical details were and still are evaluated and manipulated for the highest financial gain. From this point of view, a Safavid velvet such as Bier (1987) Cat. No. 2 must have been incredibly expensive. However, in a state supported industry, expense was no obstacle. The bottom line, of course, is the quality of the cloth and the desirability of the pattern. This velvet panel can hardly be beat.

REFERENCES

Bier, Carol (1987) Woven from the Soul, Spun from the Heart. Washington, D.C.: The Textile Museum.

Burnham, Dorothy (1980) Warp and Weft. Toronto: Royal Ontario Museum.

McWilliams, Mary (1988) "Prisoner Imagery in Safavid Textiles" The Textile Museum Journal, Vol 26. Washington, D.C.: The Textile Museum.

Pope, Arthur (1981) A Survey of Persian Art. Vol. XI, Textiles, Japan: SOPA.

Riboud,K. and Vial, G. (1970) Tissus de Touen-Houang. Paris: Louis Hambis.

Schorta, Regula (1987) "Anmerkungen zur Technik einzelner Gewebe aus

den Bamberger Grabfunden" Textile Grabfunde aus der Sepultur des Bamberger Domkapitels. Munich: Bayerisches Landesamt für Denkmalpflege, pp. 80-90.

Shosoin Office (1963) Textiles in the Shosoin. Tokyo: Asahi Shimbun Publ. Co.