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Why embroidery? An answer from the ancient Andes

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In her meticulous classification of fabric structures, Irene Emery wrote that needlework "is basically one of the simplest crafts, a homely activity that can be practiced by almost anyone on almost any material. But, with fine and carefully chosen materials plus a high degree of skill and imagination in handling them, needlework can be raised almost to the rank of a fine art" (1966:246). I suspect that Emery would not object to my deletion of the word "almost" when discussing the examples of fine art embroidered by certain pre-Conquest Andeans.

Within the ancient Andean world, needlework is not exclusively identified with Paracas Necrópolis-style and Nasca-style textiles. There are, for example, exquisite cotton Chancay headcloths worked in monochromatic embroidery on square mesh openwork or on gauze (Stone-Miller 1992:pl. 49, Young-Sánchez 1992:fig. IV.10, and d'Harcourt 1962:figs. 35, 36B, 38, 40-44), Chimú textiles with embroidered details (Rowe 1984:fig. 56 and possibly pl. 11 and fig. 133), and Inca tapestry tunics with needleworked edgings (Kajitani 1982:pls. 117-119). But it was only on Peru's south coast that artisans brilliantly exploited the particular advantages of embroidery (Figure 1). In this paper I will focus on the fabrics unwrapped from conical-shaped funerary bundles buried in a cemetery on the arid Paracas Peninsula, south of Lima. This burial zone, called the Necrópolis de Wari Kayan, was used by members of Paracas/Topará communities from at least Early Horizon epoch 10 through Early Intermediate Period epoch 2 (approximately 100 B.C. to 200 A.D.).¹

Though they produced a variety of fabric structures using different decorative techniques, the artisans who participated in the Paracas/Topará cultural tradition overwhelmingly preferred 4/2 stem-stitch embroidery on plain weave. In a sample of over 1200 Paracas Necrópolis-style fabrics housed in collections around the world, 990 employ embroidery to create designs.² Furthermore, there are nearly 100 additional finely-woven solid-color plain weaves that are undecorated; some of these may have been destined for embroidery work but were buried before it was applied. Why did Paracas/Topará artisans choose embroidery 8 1/2 times out of ten when making a decorated fabric? Why did they choose such a simple structure when technical virtuosity was not only highly prized within the Andean world but also within their reach?

¹ The chronological framework used here includes major time units called horizons and periods. The relative dates of the textiles mentioned in this article, and their possible absolute dates, are Early Horizon epoch 8 (hereafter abbreviated EH; ca. 300 to 200 B.C.), EH 9 (ca. 200 to 100 B.C.), EH 10A (ca. 100 to 50 B.C.), EH 10B (ca. 50 B.C. to 0), Early Intermediate Period epoch 1 (hereafter abbreviated EIP; ca. 0 to 100 AD), EIP 2 (ca. 100 to 200 A.D.), and EIP 3 (ca. 200 to 300 A.D.). These absolute dates are based on a series of problematic radiocarbon dates which are currently being verified with new C14 measurements on a dozen Paracas Necrópolis and Early Nasca textiles.

² This sample also includes 83 oblique interlaced headbands, belts, slings, and bags; 17 examples of knotted fabrics; 13 cross-knit looped headbands; 13 composite warp pattern weave borders; ten wide headbands constructed with a combination of compact knotting, oblique twining, wrapping, and long fringes; four discontinuous warp and weft plain weaves; four tapestry bands; four plain-weave double cloths; three looped specimens; two gauzes; two painted fabrics; one plain weave with supplementary warps and wefts; one openwork; one tie-dye; and several plain weaves with feathers attached to their surfaces.

Antecedents

The south coast of Peru between the Cañete and Grande rivers bustled with human life starting in the Early Horizon (ca. 700 B.C.), and textile production was privileged early on. Fabrics dating to the early end of the Paracas textile tradition are known by the style names Paracas Ocucaje and Paracas Cavernas.³ It is clear that the persons who made them were exploring a range of different ways to make and pattern cloth. Among other fabric structures, there are finely executed examples of double cloth, triple cloth, tie-dyed plain weave, gauze weave, discontinuous warp and weft plain weave, interlinking, and simple looping, as well as a considerable number of fabrics with embroidery.⁴ Roughly 60% of these early Paracas textiles – which are primarily tunics, mantles, and hoods – have designs embedded in their structures, while 40% have embroidered patterning. Many have motifs in their fields as well as in borders. It is important to note here that *embroidered* field designs are rare.⁵

The woven contents of the earliest Paracas Necrópolis bundles (dating to EH 10) are primarily embroidered, though several garments have structural patterning: EH 10A mantle 210-3 (RT 897) has a discontinuous warp and weft plain weave field with large bird motifs, as well as embroidered borders with small linear style birds; EH 10A mantle 349-1 (RT 1451) and EH 10B mantle 2-3 (RT 1644) are plain-weave double cloth garments with large-scale field motifs.⁶ Neither discontinuous warp and weft plain weave nor double cloth is the most suitable structure for creating the multitude of identical motifs that were to become so prominent in the fields of Paracas Necrópolis fabrics.

The contents of one of the largest bundles buried in the Necrópolis de Wari Kayan, EH 10B bundle 157, indicate that by this date a major change in Paracas Necrópolis textile design was taking place: among the 184 textile and non-textile items from this bundle, five garments have embroidered images arranged in their fields. The shift towards 4/2 stem-stitch embroidery as the preferred method of design creation on the fields of Paracas textiles accelerated dramatically at the beginning of the Early Intermediate Period and continued to dominate through EIP 2 (a period of approximately 150-200 years).

³ Many of the earliest fabrics affiliated with the Paracas textile tradition come from the lower and middle Ica Valley (from sites near Callango and Ocucaje), and from other unspecified sites in the same valley. As a group, these are given the style name "Paracas Ocucaje" to distinguish them from other south coast fabrics. In addition, the Cavernas site on the Paracas Peninsula was a repository of some of the oldest known Paracas textiles, identified by the style name "Paracas Cavernas."

⁴ See, for example, an EH 8 plain weave fragment (possibly a mantle) patterned by tie-dyeing, with a triple-cloth border (Kajitani 1982:pl. 11), an EH 9 double-cloth mantle woven in plain weave & plain weave and complex gauze weave & plain weave (Kajitani 1982:pl. 13), an EH 9 plain-weave mantle patterned by dye mordant, with a crossed-knit looped edging (Kajitani 1982:pl. 17), an EH 9 discontinuous warp and weft plain-weave tunic with triple-cloth borders (Kajitani 1982:pl. 21), an EH 9 interlinked sprang hood (Frame 1986:fig. 12), an EH 9 tunic constructed in simple looping with a plain-weave border patterned with stem-stitch embroidery (Kajitani 1982:pl. 23), and numerous EH 9 and 10 embroidered border fragments (King 1965).

⁵ In her catalogue of over 180 Paracas Ocucaje fabrics, Mary Elizabeth King (1965: 200, 205, 288) mentions only two mantles with embroidered designs in their fields.

⁶ I include here museum textile registration numbers (RT: *Registro Textil*) for readers who would like to look at photos of items housed in the Museo Nacional de Arqueología, Antropología e Historia del Perú in Lima (<http://textiles.perucultural.org.pe/>).

Why embroidery?

One of the great advantages of embroidery is that it gives the artist enormous flexibility in depicting detailed motifs, in arranging large numbers of these motifs in different positions on the cloth, and in using color in ways that are not bound to the woven surface of the fabric. Though the results of *woven* decorative techniques, such as tapestry weave, gauze weave, and double cloth – to say nothing of the various combinations of different weaves – can be indisputably dazzling (see, for instance, Rowe 1984:pls. 3 and 13, Stone-Miller 1992:pls. 22-26, and Cahlander and Baizerman 1985:pls. 2, 5, and 14), complex fabric structures impose certain restraints on patterning that embroidery on plain weave does not. I think that one reason for the primacy of simple stem-stitch embroidery within the Paracas/Topará textile tradition was that it permitted the creation of complexities of a different kind.

Paracas/Topará embroiderers worked in several different styles of embroidery, rarely mixing embroidery styles on one garment. These styles – which we call linear, block color, and broad line – were roughly contemporary; they conveyed, I believe, different types of information. Curiously, the outlines and interior details of linear style figures seem to be governed by the structure of weaving: the horizontal and vertical rows of stitches follow the warps and wefts of the ground cloth, while the diagonal lines may echo the interlacing rhythm of twill.⁷ Furthermore, the procedure for stitching linear images was conceptually closer to weaving than to embroidery (see Paul 1990a:69-73). Artists working in the block color and broad line styles, however, took full advantage of the freedom to experiment with forms that the embroidery technique offers over weaving: curvilinear shapes are abundant and many design units are depicted in intricate detail (Stone-Miller 1992:pl. 13). Though the motifs on some Andean tapestries also are woven with minute details (Stone-Miller 1992:pls. 30 and 37), needlework lends itself better to the depictions of costumes and specific plants and animals that the Paracas/Topará people described on their fabrics.

The desire to create precisely rendered and readily identifiable motifs was probably not the only motivating factor behind the choice of embroidery, however. Paracas Necrópolis iconography also communicated more abstract concepts (to be summarized below) which were embedded in the arrangement of motifs on the surface of the fabric as well as in the use of color in those motifs. Almost all weavings have embroidered border iconography, and a much smaller number have additional figures stitched in their fields. I focus my discussion here on the field figures, first describing the system of organization that underlies their orientation and then commenting on the logic behind the way in which they are colored.

Field symmetry schemes

The initial design decisions made before beginning work on a Paracas Necrópolis embroidery included the selection of style of formal construction (linear, block color, or broad line) and motif. An essential component of each motif is its symmetry, which in Paracas Necrópolis iconography is most often asymmetrical. Iconographically-alike

⁷ In a fascinating exploration of the ways in which Andean weavers may have been thinking about, and playing with, the creative and symbolic possibilities "offered by the organization of threads on the surface of textiles", Sophie Desrosiers (in press) notes that the surface effect of the diagonal lines on many linear style embroideries "is so similar to 2/2 twill that one wonders if embroiderers weren't following models woven with floats organized in this way."

motifs are aligned in rows and columns on the plane of a fabric to create a checkerboard effect, which mathematicians call a diamond lattice pattern. When embroiderers stitched images in the fields, they probably were concerned not only with the orientation of each individual iconographic unit, but also with the types of planar patterns that could be generated by the symmetrical relationships between contiguous figures (Figure 2).

The motions of symmetry present in the field patterns on these fabrics are glide reflection, bifold rotation, mirror reflection, and translation; the first two occur most frequently.⁸ In an article that should be of enormous interest to everyone in this audience, the mathematician Branko Grünbaum (1990) classifies the planar symmetries on Peruvian fabrics. Using Grünbaum's findings about patterning, I have analyzed the field patterns on 176 Paracas Necrópolis textiles. The results of this study (Paul in press) show that a large percentage of the symmetry schemes in the fields of Paracas Necrópolis textiles may share isometries with the underlying two-dimensional planar symmetry structures of certain fabrics.⁹ In addition, other textiles in the sample have repetitive one-dimensional patterns; although these regular band patterns do not allude to two-dimensional structures, they nevertheless rely on the types of symmetry motions that are at the core of fabric-making procedures: spinning, plying, twining, and interlacing.

In summary, I hypothesize that many of the symmetry schemes utilized by Paracas/Topará embroiderers may have been selected because they replicate either the symmetry of fabric structures or the regular alignment of the fiber elements that comprise the fabric plane. This design choice – achieved by stitching images on cloth – underscores the importance of fabric-making processes and the vital role of weaving in their culture (for a longer discussion, see Paul in press).

Field color patterns

One of the truly splendid aspects of Paracas Necrópolis-style textiles is their color. The ancient artisans worked with camelid fiber yarns dyed in a broad range of colors. Paracas/Topará people were master dyers. They not only developed the technology to color camelid and cotton fibers but perfected it, producing highly standardized colors – a difficult feat when using natural dyestuffs (see Paul 1990b). Apart from pure visual pleasure, color had a more esoteric function: it was used to encode a particular kind of logic in cloth. To begin with, each of the motifs embroidered on a garment is filled in with colored threads according to a master plan that specifies the color of the iconographic details of that image. This combination of colors is called a "color block"; different color blocks can be employed on a single embroidery, aligned in the field to create regular patterns along horizontal rows, vertical columns, and the S and Z diagonals, with the diagonals dominating in importance.

There are, for example, patterns of sequentially alternating monicolor diagonals. Other patterns have bicolor diagonals, with different versions generated simply by varying the number of color blocks per row and the relative positions of the color blocks in subsequent rows. There are also arrangements with tricolor diagonals, and others with tetracolor diagonals. Color patterns with tetracolor and pentacolor diagonals include

⁸ These symmetry operations are defined as follows: glide reflection is "simultaneous translation and longitudinal reflection resulting in alternate right and left images along the axis of the bands" (Shepard 1948:219); bifold rotation is 180 degree "rotation about a series of equally spaced axes (ibid.:219); mirror reflection is reflection across a central horizontal line or across a central vertical line (Washburn and Crowe 1988:46-47); and translation is a "shift of position without change in orientation (Shepard 1948:219).

⁹ See also Frame 1986.

variations that employ "wild card" color blocks (Figure 3). A combinatorial logic was the cornerstone of field color design: as I have noted elsewhere, Paracas/Topará "weavers/embroiderers attempted to combine color blocks in as many different color configurations as possible within the limitations of certain compositional constraints; following these rules, most of the possible patterns of alternation were tried among the 153 specimens in my sample" (Paul 1997:124). Just as most of what I think were the acceptable symmetry patterns were tried at least once on the textiles, so were the ways of organizing color blocks. It is hard to imagine that the range of orientation patterns present in the fields of Paracas Necrópolis-style weavings, along with the number of different color patterns, could have been obtained in another structure.¹⁰

One intriguing and mysterious aspect of Paracas Necrópolis field designs is that the two systems of organization described here have gone unnoticed on the actual textiles; by reducing detailed iconography to simple arrows (indicating symmetry type) and letters (representing color blocks) these complexities become more readily apparent to contemporary observers (Figures 2 and 3). Both the makers of the embroideries and their intended audience must have been extremely determined and sophisticated to have created and appreciated these design permutations, and to have transmitted the knowledge of the systems from generation to generation.

Embroidery as a structural choice

The choice of stem-stitch embroidery on plain weave may have been motivated by additional factors, trickier to demonstrate but worthy of consideration nonetheless. Specifically, embroidery may have been a structural choice, and not simply a decorative one. This idea was suggested to me by Blenda Femenías (personal communication 2002), whose insights into the modern production of traditional dress in communities along the Colca River in Caylloma province in south highland Peru can be useful in expanding our thinking about the choices made by ancient fiber artists (Femenías in press). Many women in the Colca Valley wear sumptuous outfits that include elaborately embroidered jackets, vests, shawls, hats, and voluminous *polleras* (skirts). According to Femenías (personal communication 2002), "the artist decides in advance to use embroidery in particular ways, knowing it will affect the ground fabric or even cover it completely." Colca machine embroiderers, for example, "layer two or more fabrics, often very different, and embroider through all the layers. So, although each layer of 'ground' fabric is quite thin, the resulting fabric is thick and stiff, durable, heavy – 'adding' the embroidery qualitatively changes the fabrics under it and creates something entirely new." Femenías (personal communication 2002) believes that the purpose of the cloth often dictates how it was made: "In wearing *polleras* women bundle themselves. They complain about how heavy the skirts are, but in dancing the heavy borders are what give the skirts enough weight to fly out into space, which actually helps the dancers keep spinning."

Whether the function of Paracas Necrópolis cloth in any way influenced the decision to favor embroidery remains an open question, because in order to evaluate the effects of the bulk and weight of embroidery on the "life" of a garment when worn, I would need to make a set of embroidered clothing – something that is beyond my particular skills. However, I wonder whether Paracas/Topará embroiderers purposefully

¹⁰ Elayne Zorn (personal communication 2002) has suggested the "the textile obsessed Andeans could have done it in tapestry."

did something similar to Colca embroiderers: by embroidering over the ground fabric in the border zones of all garments as well as in the fields of some mantles, ponchos, skirts, and headcloths, they created a heavier but pliable fabric which may have provided a desired bulk when worn on a living person or layered in a burial bundle.

Mode of manufacture

The choice of the means of decorating cloth may also have been related to the method of production. Numerous artisans worked side-by-side to complete the embroidery on some of the largest items (such as mantles and skirts; see Paul 1992:figs. II.9 and II.12), and even smaller garments may have had a couple of embroiderers (slight differences in color blocks are clues that different hands worked together on some ponchos, for example). In some instances the persons embroidering on a single item had strikingly different levels of competence (Paul and Niles 1985); the use of embroidery on a plain-weave ground cloth clearly allowed a master artist or artists to create the composition (including the style of embroidery, motif, symmetry pattern, and color pattern), with the actual execution carried out by a variety of craftspersons.

In ways that we do not fully understand, Paracas/Topará textile production was "controlled" from above, or at least coordinated from beyond the borders of an individual garment: the rigorous adherence to a set of design principles throughout much of the tradition; the coherent choice of symmetry schemes and the comprehensive combinatorial logic underlying color patterning in fields; the similarity in the universe of iconographic themes in the different Paracas Necrópolis bundles; the iconographic consistency of linear style motifs from garment to garment and over time – all suggest that the weavers and embroiderers of Paracas Necrópolis ritual attire were decidedly conformist, rigidly adhering to certain "rules". In spite of the great visual variety projected by the large corpus of Paracas Necrópolis textiles, the persons who participated in this textile tradition produced individual items that were integrated into a greater whole (though there *was* some liberty for the expression of personal taste in certain elements of design; see Paul 1991).

Blenda Femenías (personal communication 2002) has suggested another advantage of embroidery: "For a stratified society with an artist/artisan stratum, it's important to use a technique that allows a number of individuals to work at once." The choice of embroidery as the mode of manufacture – with one group of weavers producing meters and meters of easy-to-do plain weave and another group of (usually) highly skilled needleworkers stitching motifs – could have "exerted pressure within the society to create different levels of skill, thus helping to create, and not just reflect, a stratified society" (Femenías personal communication 2002).

Last, but perhaps not least, sitting around a large cloth with workbaskets full of differently colored skeins of beautifully spun and dyed thread, the embroiderers in a workshop environment must have had – at least on some occasions – a pleasurable time, not an inconsequential fact considering the number of hours spent in this activity.

Conclusions and sequel: after 4/2 stem stitch

A cluster of transformations in south coast textiles at the end of EIP 2 give credence to the arguments presented here for Paracas/Topará artisans' preference for 4/2 stem-stitch embroidery: single-faced embroidery begins to be "abandoned" at approximately the same time as there are changes in iconography, field symmetries, color schemes, and methods of production. A handful of textiles from the last bundles buried in the Necrópolis de Wari Kayan point to a change in the vocabulary of south coast

textiles; I refer to these as "transitional" weavings because, though still anchored in the Paracas Necrópolis textile tradition, they introduce elements that are more often associated with the subsequent Early Nasca textile style. Sharing certain, yet different, traits with both, they connect one culture to another. By the beginning of EIP 3, textiles originating from the Río Grande de Nazca drainage (south of the Paracas Peninsula) indicate the emergence of a new textile style, reflecting, I think, societal changes within south coast communities (see Paul 2002, Paul in review).

Early Nasca artisans continued to produce extraordinary needlework, epitomized in world-renowned masterpieces of 6/4 reversible stem-stitch and three-dimensional cross-knit looping (for illustrations, see Sawyer 1997). However, even though needlework was still favored, these artisans simultaneously explored many different ways to make and decorate cloth (see O'Neale 1937 and Paul 2002). Intricate iconography is characteristic of some Early Nasca needlework, but it appears in borders rather than in the fields of weavings. Field motifs, when present, tend to be less elaborately depicted, and are usually arranged in a rectangular lattice instead of the diamond lattice characteristic of Paracas Necrópolis textiles. Field symmetry schemes differ from those on Paracas Necrópolis textiles. Furthermore, regular color patterning in fields is less prevalent in EIP 3 textiles, and when it is present the pattern seems to adhere to rules that are different from those that underlie the patterns on Necrópolis textiles.

Unlike the makers of Paracas Necrópolis-style embroideries, Early Nasca artisans seem not to have shared with each other many of the same principles of textile design; for instance, the weavers who participated in this textile tradition apparently had more liberty than their Paracas/Topará counterparts to make individual decisions about how to arrange and color motifs. There were also differences in the modes of manufacture: many Early Nasca fabrics have structures that are incredibly labor intensive, but the labor was likely of one or two individuals per product (each cross-knit looped border band, for instance, was worked by a single set of hands at a time, not by the group of embroiderers who stitched a Necrópolis mantle). The existing picture for the production of textiles in EIP 3 Nasca society is one of a smaller scale (and less controlled from an outside source) than that for Paracas/Topará communities (see Paul 2002).

To conclude, it seems likely to me that the choice of needlework by the ancient artisans of south coastal Peru was intimately tied to the conceptual content of textiles and to the political organization of the people who produced them. This attempt to understand why one particular type of embroidery stitch flourished among Paracas/Topará artists demonstrates how it is possible to incorporate fiber, one of ancient Andeans' most precious materials, into our interpretation of a remarkable civilization.

Acknowledgments

Like the Paracas/Topará women of long ago who likely learned from each other as they completed the embroidery tasks at hand, I have benefited from the generously-shared ideas of numerous friends. In particular, I thank Blenda Femenías, Margaret Young-Sánchez, and Elayne Zorn for their interest and comments during the preparation of this article.

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Figure 1. Paracas Necrópolis mantle 382-7 (RT 1443), EIP 1, Museo Nacional de Arqueología, Anthropología e Historia del Perú, Lima. Anthropomorphic images embroidered in the block color style appear in the field and in the borders. Photograph by Anne Paul.

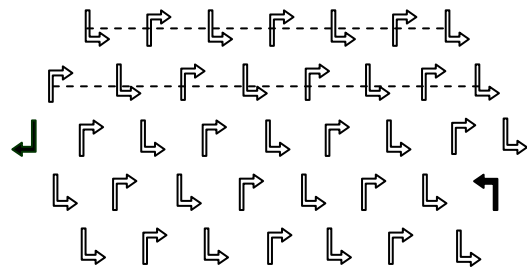


Figure 2. Diagram of field symmetry pattern on mantle 382-7 (the four corner figures with embroidered border background are not included here). Each asymmetrical motif is shown as an arrow; the dashed lines indicate axes of glide reflection within horizontal rows. The specific symmetries favored by Paracas/Topará embroiderers rely on the type of symmetry motions that are at the core of fabric-making procedures (see Paul in press). Black arrows represent motifs whose orientations do not conform to the rest of the symmetry pattern on the mantle. Diagram by Anne Paul.

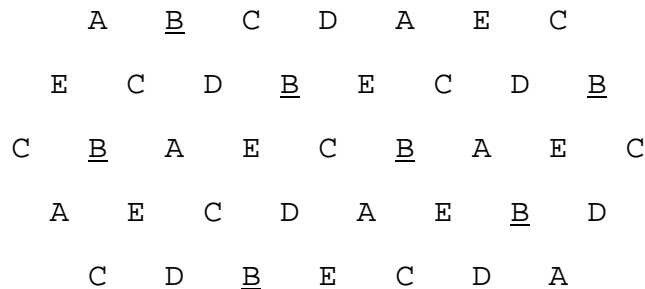


Figure 3. Color pattern in the field of mantle 382-7. Each motif is stitched in one of five different possible color combinations, or "color blocks", indicated by a letter (A-E). The field pattern is based on four color blocks (two different color blocks alternate along the S diagonals and four different color blocks alternate along the Z diagonals, rows, and columns), with a fifth color block acting as a substitution wild card. The wild card is underlined in the diagram. Diagram by Anne Paul.