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Anne Paul

Centre National de la Recherche Scientifique, Paris

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The organization of work on ancient Peruvian embroideries:
putting people back into the cloth
Anne Paul
UPR 191, Centre National de la Recherche Scientifique, Paris

During the early years of this century, treasure hunters working the arid Peruvian south coast discovered well-preserved textiles that were unlike anything previously known from the Central Andes. Simple in structure (plain weave with embroidery) but stunning in appearance, these textiles had been hidden from human eyes for almost two millennia, buried in desert graves on the Paracas Peninsula. One of these textiles, a mantle in the collection of the American Museum of Natural History in New York, is the subject of this essay. It and other Paracas textiles are so remote from us in time and in culture that it is sometimes easy to overlook the fact that they were woven and sewn by real human beings. In this paper I will show how scrutiny of the many tiny details of embroidered images can sometimes reveal the presence of the human beings who stitched them nearly 2000 years ago. While the mantle in the AMNH is the focus of this paper, summaries of previously-published studies will show how each Paracas fabric is potentially unique in terms of the information it provides about working procedures. All of the textiles discussed here likely originated from funerary bundles buried on the peninsula during Early Intermediate Period Epoch 1, approximately 0-100 A.D.

Previously-published studies

There are various ways of reconstructing the steps followed in the fabrication of Paracas embroidered textiles, and some fabrics have more clues than others. When the embroidery on a garment is unfinished, for instance, the creative process is «frozen» midstream, leaving traces of how work was proceeding. Likewise, when the people working together on a piece were of different levels of competence it is sometimes possible to distinguish between a skilled worker and one who was less adept. Both of these types of evidence are present on a textile that was among the wrappings of bundle 382 from a cemetery on the Paracas Peninsula (Paul and Niles 1985). Mantle 382-37 was originally covered with the outlines of 429 anthropomorphic figures. Some images are only partially outlined, others are completely outlined but not filled in, and still others are only partially outlined but already have some details filled in with embroidery. An examination of every figure on the mantle revealed that many people were involved in the textile's embroidery, and that some workers were considerably more experienced than others.

The hands at work on mantle 382-37 were initially identified by looking for discontinuities of design between figures worked in one part of the piece and those worked in another part. Recognizable differences in the figures worked by different embroiderers occurred principally in the scale of figures and the proportion of one body part to another. The inventory of hands at work was refined by examining the order in which design elements were added to the figures. This could be discerned, in many cases, by the fact that although some figures in a section are not complete, most of the figures within a section presumably worked by one individual have the elements added in a fixed order. All figures on the mantle are provided with heads and bodies, but different workers add other design elements in different orders. Both the identification of the hands at work and the assessment of the individual workers' skills were further refined by looking at the errors made in certain parts of the piece. Those errors that proved most diagnostic related to the proportion of the figures and their orientation on the piece. Taking into account all of these features, it is possible to identify the characteristic work of 13 to 17 embroiderers as one moves across the length of the mantle (ibid.:figs. 5-13).

In inventorying the hands at work on mantle 382-37, it is clear that there are workers of at least two levels of proficiency. Figures embroidered by skilled workers are neatly stitched, iconographically correct, and, in general, correctly oriented on the ground cloth of the mantle. The images embroidered by less competent workers are outlined in loose stitches; they have body proportions that are often awkward and inconsistent among figures rendered by the same worker. Considering the overall arrangement of hands at work on this mantle, one can infer that work proceeded in columns and that good embroiderers and learners were, to some extent, interspersed among one another. It

is likely that good workers sat next to poor workers, probably monitoring their work and setting models for the iconography and design of the piece. The involvement of both experienced and inexperienced embroiderers on a single mantle, organized in this fashion, suggests that there may have been an apprentice system among some Paracas weavers.

Mantle 382-37 is unusual among Paracas textiles in that much of its workmanship is poor, but it is precisely this feature that permits us to reconstruct work patterns. Most textiles from this culture are better stitched, but these reveal less about work habits: it is more difficult to distinguish the individual work of skilled embroiderers than of clumsy ones, because skilled work is more consistent. When well-made textiles stitched by embroiderers of equal competence are unfinished, however, we sometimes can reconstruct how work proceeded on the piece. Mantle number 14 from bundle 89 is such a textile (Paul 1986). Its field has the stitched outlines of human figures disguised as falcons. These outlines are only partly filled in with solid color. The scale of the figures and the proportion of one body part to another are generally consistent from one image to another, the iconography is accurately recorded, and all of the actual stitching is well-done. In other words, even though worked by several people, this mantle projects an iconographic and formal uniformity. It is not easy to discern the work of distinct individuals on a piece with such consistently well-executed images because the range of differences among them is very small.

Nevertheless, there is one revealing stage in the production of this mantle: the filling in of the outlined figures with an array of colored yarns. Each image on the fabric is a discrete iconographic unit comprising over twenty constituent parts, and the color used to fill in a specific part of any single image was predetermined by the color of each other part of the image. The specific color configuration of these constituent parts is called a color block. When the color of almost any component is known, all other colors on the image can be predicted.

There are five distinct color blocks on mantle 89-14. Since the images on the field are iconographically identical, the same components in each must be colored in with stitching. All images have four parts completed; these parts are the same and were always stitched first, presumably to set the color block of each image. However, from this point on there was no predetermined rule that governed the order in which the constituent parts of an image were completed. As it turns out, each worker had a preferred order for coloring the figures' design elements. When the inventory of hands at work on mantle 89-14 is plotted on a diagram (ibid.:fig. 11), it becomes clear that the images colored by a single person align vertically on the mantle, usually in contiguous columns of design. For the most part, labor is evenly divided among eight embroiderers, each of whose hands are evident in tidy vertical clusters of figures.

The fact that mantle 89-14 is unfinished allows us to recreate some of the ways in which embroidery work was organized on its field. It is considerably more difficult, if not impossible, to identify distinct hands of embroiderers when the work is finished. Nevertheless, it is possible to detect the distinct work areas of different people embroidering mantle 31.501 in the Museum of Fine Arts, Boston because the formulation of the color-block pattern was not resolved correctly (Stone-Miller 1992:pl. 11 and Paul 1992). This fabric has dozens of shaman images embroidered on its field, stitched according to four different color blocks. Although the color blocks on the field of Paracas garments normally are arranged in very specific patterns, irregularities in the execution of the color repeats on this mantle obscure the intended pattern (for a discussion of Paracas color patterns, see Paul 1997). The correct pattern of two bicolor Z diagonals is achieved in only a few places (ibid.:fig. II.12). Several factors contribute to this unresolved arrangement of color blocks (such as the incorrect number of images in three columns, the reversal of vertical color block sequencing, and misalignments of columns of color blocks). Suffice it to say here that 1) the inconsistencies in the color pattern cluster into regular units, 2) these units indicate that the work areas on the mantle were vertical blocks of contiguous columns, and 3) there were probably at least four people filling in all the shaman outlines with colored yarns.

AMNH mantle 41.0/1500

Mantle 41.0/1500 in the American Museum of Natural History was acquired in 1915, ten years before the scientific discovery and exploration of the Paracas Peninsula sites. Its green camelid fiber field has 124 depictions of a human figure wearing a tunic, an elaborate headdress, and anklets (Figure 1; this count does not include the figures in the border brackets). The image has braids, and holds a club in one hand and a staff with two bodiless heads in the other. A fabric band appears to be draped around one arm.¹ All figures are finished or nearly finished, and are stitched by uniformly-competent embroiderers. The images are oriented in the same vertical direction, but they alternate in lateral orientations with all of the figures in a given Z diagonal facing either to the right or to the left (Figure 2). The field figures are colored according to four color blocks, arranged in a pattern of two bicolor Z diagonals (Figure 3). The orientation and color block patterns have no errors. All in all, most of the evidence necessary to detect different hands at work is concealed on this textile. There are a number of details in the embroidery, however, that indicate that the work on mantle 41.0/1500 was not organized in the same ways as on the fabrics described above.

One significant step that is omitted on this mantle is the initial outlining of every figure on the field. This «sketching» of figures with thread -- the usual way of starting block color style images, including those seen on each of the fabrics described above -- establishes their silhouettes as well as important internal details such as the shapes and boundaries of costumes, headpieces, and handheld items. The master plan for the iconography, figural orientation, and symmetry pattern of a textile is set during the outlining stage. Outlining theoretically allows for correction of iconographic and orientation mistakes at a point when it is easy to make changes (although such corrections were not always made, as witnessed in the work of the unskilled embroiderers on mantle 382-37 above). In contrast to the working procedures followed in the fabrics described above, the embroiderers of mantle 41.0/1500 began by directly stitching the solid color areas of the figures without the benefit of outlines. It is likely that the correct scale and alignment of images were marked with temporary basting threads, one of which still exists next to the extended hand with club of the figure in column 4, row 3 (such basting stitches, used to establish a grid that kept figures in their proper places on the ground cloth, are present on other Paracas textiles; see, for instance, Paul 1992:27 and fig. II.6).

A single detail of one image on the mantle suggests that the first parts of the figure to be stitched were the arms and legs. The clue lies in the color of a hand. When data are collected on garments, the «rules» are ascertained for each color block on a piece, and then every image is examined to check for compliance with or deviation from those rules. The rules for the four color blocks on mantle 41.0/1500 are presented in Figure 4.² Consistency and variation among the color blocks on any given garment create intelligible patterns that can help reconstruct some of the procedures followed in the making of that fabric. For instance, «navy» is the correct color for the body of color block C figures; with a single exception, all of the arms and legs of color block C images are stitched with navy threads. It is the single exception that is revealing: the hand of the extended arm of the figure in column 7, row 6 is red, the body color for color block B. Because all of the other parts of the figure (including the club held in the red hand, the navy upper arm that goes with the red hand, the second arm, and the legs) are correctly colored according to the rules for color block C, we can surmise that the first thing stitched for the figure was this hand and that the mistake in color choice was caught and corrected once the hand was completed. Since the figures on this mantle were not outlined, color-coding the interior of outlined parts with snippets of short colored threads (a method that facilitated correct resolution of the color blocks on some Paracas embroideries) was not an option. The choice of color block, and hence the overall color pattern on the mantle, was made with the first stitch of each figure, and this first stitch probably was always in an area of a hand, an arm, or a leg.

It seems probable that the second color area of each image to be stitched was the tunic. This conjecture is based in part on the fact that color blocks A and C both have

very dark bodies and therefore are difficult to distinguish as separate color blocks at this early stage in the embroidery.³ Once the tunics are stitched the four color blocks are unequivocally distinct. In addition, the tunic and the body parts are contiguous and logically would be sewn consecutively or simultaneously. Furthermore, the tunic is the largest area of solid color in the figure and thus is the easiest area to spot when trying to establish the identity of a color block.

There are clues in the red tunics of color block C figures and in the red legs of color block B figures that the organization of work at this early stage of embroidery involved two or three separate people who were stitching in discrete zones. Sometimes different shades of one color of yarn appear on a single garment, the result of dyeing the yarn in different dyebaths; these color variations may be visible in the finished garment. Among the colors of yarn used to embroider the images on mantle 41.0/1500, red is particularly interesting. Three distinct dyelots of red can be identified on this mantle, one of which is still in good condition, one of which is entirely deteriorated, and one of which is partially deteriorated. When the use of nondegraded versus degraded and partially degraded yarn is plotted on diagrams, patterns of yarn usage emerge. Figure 5 charts the occurrence of red yarns in the tunics of color block C figures. All tunics in columns 2-12 are stitched with yarn that is still in good condition 2000 years after it was dyed. In contrast, no image in columns 13-20 has a tunic left because all of the red yarns in those areas have rotted. All color block C figures in columns 21-28, as well as one in column 1, have tunics in which the red yarns are partially degraded -- we can see that they are red but the red thread is not in very good condition.

One possible explanation for this distribution of differently-dyed red yarns is that three different embroiderers were at work in three areas of the mantle, each drawing from a personal workbasket of thread. It has been suggested elsewhere, in trying to explain the fact that the two different green threads used to outline the figures on mantle 382-37 were strictly segregated between the skilled and unskilled embroiderers, that the lesser weavers «did not draw from the workbaskets of their superiors» and that «perhaps individuals prepared their own threads» (Paul and Niles 1985:12). Though there is no additional evidence to validate the conjecture that personal supplies of thread were used in different work zones on the AMNH mantle, it is at least clear that there was little overlap in the use of the three dyelots of thread in the large sections of red tunics.

The other major design feature that is red on this mantle is the body of color block B. With a few exceptions, the red arms and legs of the figures in columns 1-12 and 21-28 are intact while those in columns 13-20 are rotted out (Figure 6). There are a couple of intrusive exceptions in each zone, such as figure 12-1 that has one arm gone but the rest of the body preserved, or figure 20-1 that has one arm preserved and the rest of the body gone. There are only three color block B figures in which parts of the red bodies are beginning to deteriorate. When the charts of red dyelots for tunics and bodies are superimposed, there is a close correspondence between the left-hand zone of preserved reds and the central zone of destroyed reds; the right-hand zone of red bodies has mostly well-preserved thread. The strict segregation of these zones argues for a working process in which three embroiderers established all the critical patterns -- iconographic, color, orientation, and symmetry -- with the stitching of just bodies and tunics. There is no corroborating evidence from the bodies and tunics of color blocks A and D because these are stitched in colors that exhibit no differential preservation.

While the first stage in the stitching of the figures seems to have been segregated into three areas, each of which may have been worked by a distinct individual, a different, more varied, process can be seen in the completion of other aspects of the images. By examining the type and distribution of deviations from the color block rules it is feasible to pick up traces of working procedures. There seems to have been a fair amount of freedom in how work on the piece progressed, and I have the impression that work was less methodical than on the Paracas fabrics discussed above.

The embroiderers of this mantle were not working in neat vertical blocks after the completion of bodies and tunics, with each person finishing entire figures. Instead, some of the work of a single embroiderer occurs in areas that are scattered around the cloth. For instance, I think that one individual moved around the mantle to complete one design feature on six color block A figures (Figure 7). In each case, the tail of the green headcloth is stitched in the «wrong» color, green instead of purple. It is evident that this

person understood the iconography and therefore knew that, in theory, the body and tail of the headband should be the same color, but she failed to realize that the rules had been changed for this particular color block (see endnote 2 for explanation). No other figure on the mantle exhibits color confusion for this feature. The same embroiderer may have stitched the same design feature on other color blocks but identification of a hand at work is not possible without some sort of clue such as a color mistake.

Another color anomaly occurs in thirteen color block C figures (6-1, 8-3, 14-9, 17-8, 18-5, 20-7, 21-4, 22-1, 22-9, 23-7, 24-3, 26-5, and 27-2) and a single color block D figure (24-1): the two colors in the elbow bands are reversed, with the color that should appear on the inside switched with the color that should appear on the outside. An additional color irregularity (a staff pendant that is purple instead of red) occurs on some but not all of the same color block C figures, as well as on other color block C figures that have the elbow band correctly colored. In other words, there are different combinations of color mistakes, as though any given figure was sewn by different people. The embroiderers of these particular figures seem to be working by specific design feature (elbow band or staff pendant), each individual moving around the cloth embroidering specific elements rather than stitching all of the elements on a single iconographic unit, almost as though there was some kind of division of labor among embroiderers that resembled assembly line production.

Other evidence that some embroiderers were dividing work by design element and were stitching on figures that are dispersed around the cloth is present in the use and distribution of pink yarn. The color pink appears in two or three separate features of each color block (see Figure 4), but among all of the figures on the mantle only twenty-seven have some detail stitched with degraded pink thread. Significantly, the two dyelots of pink thread are segregated in part by iconographic feature. For instance, color block D has a pink staff and a pink head on the club, but it is almost always one or the other that has the degraded pink thread (8-9, 10-3, 11-8, 12-5, 13-2, 14-7, 15-4, 16-1, 17-6, 18-3, 19-8, 20-5, 21-2 have a deteriorated staff; 5-2, 7-4, 8-1, 23-4 have a deteriorated club head; and 1-6 has both; see Figure 8). I conclude from this yarn distribution pattern, in which the two pink parts on a single figure are sewn with different dyelots of thread, that the embroiderers were working by design element first, and not by color. That is, they were not sewing all of the pink areas on a single figure and then moving on to other pink areas on other figures, but rather were doing either all staffs or all club heads on a number of figures at once.

The distributions of the color irregularities discussed above (as well as others that are not presented here) suggest that some individuals moved around the surface of the mantle embroidering specific iconographic features. There are also traces of embroiderers working a particular detail on figures that cluster together. The most obvious example of work that breaks down by design element and by zone is the stitching of some braids (Figure 9). All braids, as well as many other iconographic details, are black. But it is only the black thread in certain braids that is completely degraded (the dark body of a single color block C figure in column 2, row 5 is in the process of deteriorating). This indicates, I believe, that 1) the embroiderers did not stitch black braids and other black features at the same time, and that 2) they organized their work based on iconographic part rather than on the completion of single figures. Here, the figures group into two zones that are worked in different ways. The person embroidering the braids in columns 4-10 moves around within the zone stitching primarily color blocks C and D, while the person in columns 21-24 works all four color blocks in neat Z diagonals.

The image embroidered over the surface of mantle 41.0/1500 comprises over thirty parts, but not every figure is complete. Among the 124 figures, twenty are missing one or two parts. Some of these unfinished figures are scattered around the textile, while others are concentrated in columns 17-18 and 20-21; they include examples of all four color blocks (Figure 10). Only four elements appear among the missing details: staff pendant (10 cases), club (5 cases), end of headband (4 cases), and headcloth (4 cases). Although it is conceivable that these are inadvertent omissions (it requires rather careful study of the mantle to realize that the features in question are not there), a more plausible explanation is that the embroidery is not finished. If this is the case, the distribution pattern of incomplete iconography underscores the impression that while some

embroiderers worked around the cloth (see above), others worked in discrete zones of contiguous columns.

In conclusion, multiple clues hidden in the details of dyelots and color anomalies reveal that work on mantle 41.0/1500 was organized in different ways at various stages in the fabrication of the mantle. Several persons working in three vertical zones initially laid out the design plan. Afterwards, there seems to have been no hard and fast rule for how work should proceed, except that it apparently was not by individual figural units. Though this mantle reveals less than other Paracas fabrics about how its embroiderers organized their work, it is still possible to «see» the hands of some of the persons who stitched its 124 field images so long ago.

Acknowledgments

Several days before presenting this mantle to participants in a TSA site seminar in the American Museum of Natural History, Blenda Femenias and I spent an entire day with the mantle in a storage room of the museum. We worked as team, I reading out the color rules for the appropriate color block of every image, and Blenda checking every stitched detail against the color rules as well as offering her lucid comments. Without Blenda, it would have been impossible to complete the color notation and hence to write this paper. To say that I am grateful is a serious understatement my appreciation.

I also thank Textile Conservator Vuka Roussakis and Assistant Textile Conservator Anahid Akasheh, both of the American Museum of Natural History, for having generously facilitated my study of the mantle.

¹ The same iconographic type is present on a mantle illustrated in Lumbreras 1974:fig. 102 and on a skirt illustrated in Stone-Miller 1992:pl. 7.

² Note how the rules can be adjusted when necessary: the color code requires that the body of the headband as well as the « tail » that hangs to one side should be the same color on any given color block. This rule is followed for color blocks B, C, and D only. Color block A has a headband whose main color is green (called « verde » in the color chart to distinguish it from « G » for « gold »), but its appendage is usually purple. The reason for this modification of the rule is that the ground cloth on which the images are stitched is green, against which a green appendage is not very visible. Six color block A images do have green appendages, but this choice is considered to be a deviation from the « correct » color.

³ All color block A bodies are stitched with navy thread. Color block C bodies are coded here as « navy », though in many cases they look almost black. It is probable that the embroiderers saw a distinction between the two colors that I did not pick up (due to slight changes over time, for instance, or inadequate lighting conditions).

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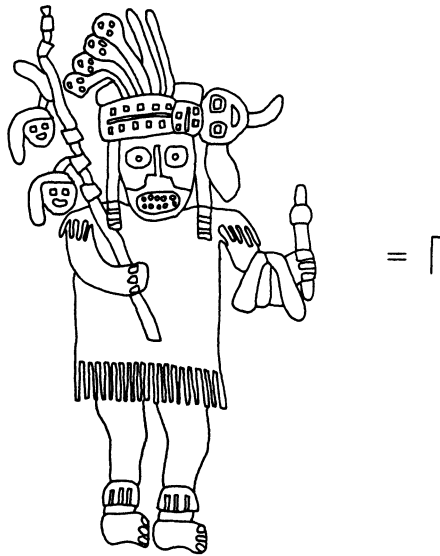


Figure 1. Image on mantle
41.0/1500 in the AMNH.

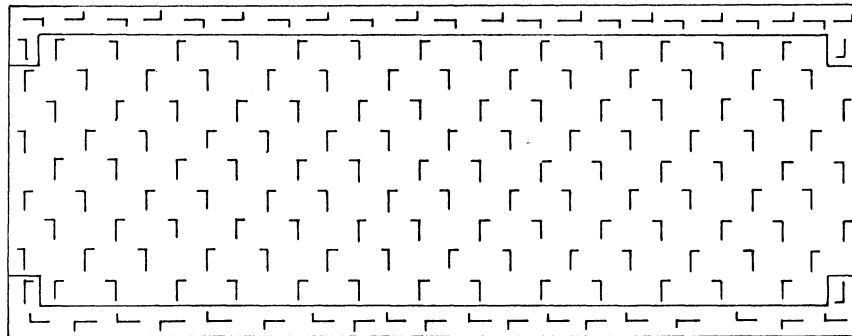


Figure 2. Orientation pattern.

9		A		B		C		D		A		B		C		D		A		B		C		D		A		
8	C		D		A		B		C		D		A		B		C		D		A		B		C		D	
7		B		C		D		A		B		C		D		A		B		C		D		A		B		C
6	D		A		B		C		D		A		B		C		D		A		B		C		D		A	
5		C		D		A		B		C		D		A		B		C		D		A		B		C		D
4	A		B		C		D		A		B		C		D		A		B		C		D		A		B	
3		D		A		B		C		D		A		B		C		D		A		B		C		D		A
2	B		C		D		A		B		C		D		A		B		C		D		A		B		C	
1		A		B		C		D		A		B		C		D		A		B		C		D		A		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Figure 3. Color block pattern.

<u>COLOR BLOCK</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Body (arms and legs)	N	R	N	Bg
Tunic	G	N	R	T
Headdress: feathers	LtBl	Pr	Pk	Bg
: snakes/eyes	R/W	W/Bk	Bl/R	N/W
: headcloth	Pk	R	Bg	Bl
: headband body	V	Bl	Bg	G
: headband «zipper»	Pr	Bg	Bk	R
: headband tail	Pr	Bl	Bg	G
: face/tongue	W/Bl	Pk/Bk	LtBl/Bk	Pr/Cr
Face: top	Pk	Bg	Pr	Bl
: bottom	Bk	W	Bg	R
: mouth	R/W	R/W	Bk/W	Bg/R
: eyes	Bk/W	Bk/W	Bk/W	Bk/W
Braids/ties	Bk/W	Bk/W	Bk/W	Bk/W
Staff	Bl	Bg	W	Pk
: pendant	W	Pk	R	LtBl
: top head/eyes/hair	R/LtBl/Bk	Pr/W/Bk	Pk/Bk/Bk	Cr/Bk/Bk
: bottom head/eyes/hair	G/Pr/Bk	LtBl/Bg/Bk	Bl/W/Bk	Cr/R/Bk
Club: stick/head	R/LtBl	LtBl/Bg	W/Bl	N/Pk
Elbow band: inner	Pr	W	V	LtBl
: outer	G	Bk	Pk	R
Anklets	V/Pk	W/Bk	Bg/R	Bk/W
Nails (finger and toe)	W	W	W	W
Color code:				
Bg = beige	Cr = cream	N = navy	R = red	W = white
Bl = blue	G = gold	Pk = pink	T = teal	
Bk = black	LtBl = light blue	Pr = purple	V = verde	

Figure 4. List of design features and color blocks for the images on AMNH mantle 41.0/1500.

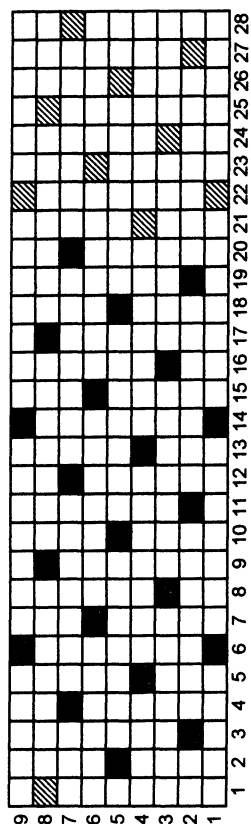


Figure 5. Diagram showing red yarns in color block C tunics.

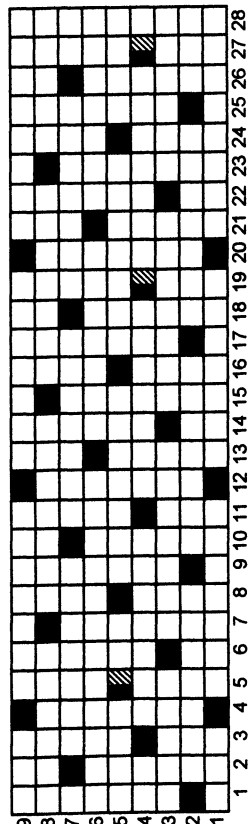


Figure 6. Diagram showing red yarns in color block B bodies.

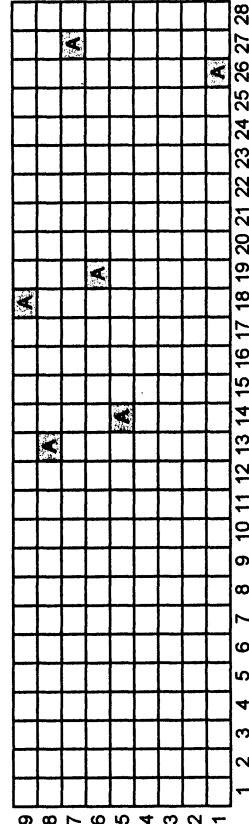


Figure 7. Diagram showing location of color anomalies on color block A headcloth tails.

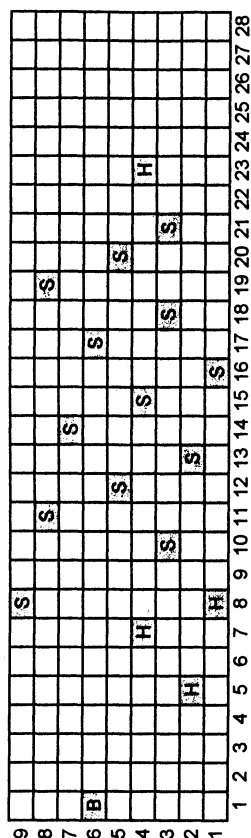


Figure 8. Diagram showing distribution of degraded pink thread in color block D figures (S = staff, H = head of club, B = both).

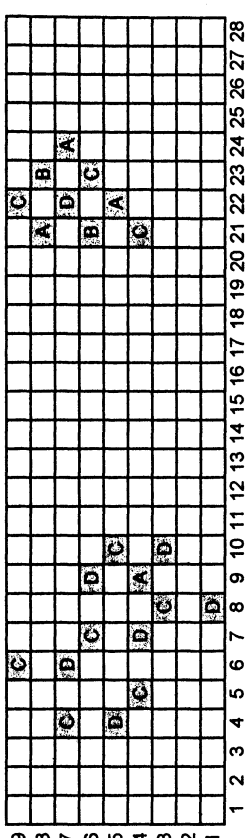


Figure 9. Diagram showing distribution of braids stitched with degraded black thread.

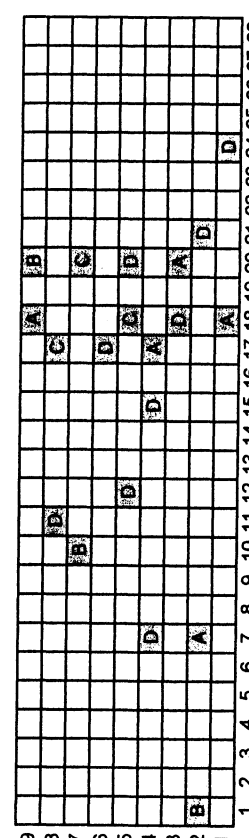


Figure 10. Diagram showing location of unfinished figures.