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TEXTILE SOCIETY OF AMERICA
11TH BIENNIAL SYMPOSIUM
SEPTEMBER 4 - 7, 2008
2008
TEXTILES AS CULTURAL EXPRESSIONS
HONOLULU, HAWAI'I

Woven to Shape: a Pre-Columbian Trapezoidal Tunic from the South Central Andes in the Metropolitan Museum of Art

Elena Phipps

Introduction[1]

Garments used throughout the Southern Andes from the early Pre-Columbian era to at least the time of the Spanish arrival in the sixteenth century, traditionally were constructed of single or multiple webs of rectangular four-selvaged cloth sometimes folded and seamed, but rarely cut to shape. As a result, the drape and style of most garments retained the rigid outlines of their originally constructed rectangular format.

Figure 1. *Trapezoidal tunic. Metropolitan Museum of Art. Bequest John Elliott. Accession number 2000.160.25 (Photo: author.)*

Sometime after the eighth century A.D., along the far south coast of Peru and northern Chile, a different garment style developed. This featured a tunic with wide, curving shoulder, tapered sides, and sometimes bulging lower edges that was woven to shape by utilizing unusual technical features. Found in the region between the southern Peruvian valley of Moquegua and down through Arica and Pica, in northern Chile, these garments are associated with the emergence of the Tiahuanaco culture from highland Bolivia that establishes a presence in the region (900 to

[1] Thanks to Amy Oakland and Michelle Bonnice, both invaluable critical readers.

1100 AD).[2] There remain many questions as to the origins of this garment type, and the relationship of these shaped tunics to Tiahuanaco culture.[3] They are ubiquitous yet unique to the region and the Metropolitan Museum has an unusual example of the type. This article focuses on the Museum's tunic detailing the special technical features and complex method used for it's construction, while underscoring the extraordinary weaving traditions of the Andes (Fig. 1).[4]

The Metropolitan Museum of Art Trapezoidal Tunic

The trapezoidal tunic with checkerboard design came to the Museum through the bequest of John B. Elliott in 1998, along with a number of other Andean materials.[5] This garment, possibly a woman's dress, in its quality and complexity represents the finest of the tradition. The large tunic or *camisa* (as they are referred to by archaeologists of the region) has a broad, sweeping and slightly curving shoulder line that tapers to the lower edge, creating its modestly trapezoidal shape.[6] It is formed from a single length of woven cloth, seamed down the sides, with openings for the arms and neck.[7] Small clusters of white feathers (two on each side) are attached with strings and positioned at the neck opening, along the shoulder line. The arm openings have been stitched closed, likely in antiquity prior to its burial.

The garment's overall checkerboard design is composed of alternating pink and purple color blocks, with a horizontal band of small polychrome squares forming a zigzag design at the chest. The outer edges of the garment have a series of long, narrow vertical stripes in green and purple,

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[2] Various scholars have brought attention to these garments, establishing their archeological contexts and cultural significance including:
Junius Bird 1948 Excavations in Northern Chile. *Anthropological Papers*, American Museum of Natural History, vol. 38, part 4, pp 171-318; Lilliana Ulloa 1982 "Evolucion de la Industria Textil Prehispanica en la Zona de Arica" *Chungara* 8, Feb (pp 97-136); A. Oakland. (1986).*Tiwanaku Textile Style from the South Central Andes, Bolivia and North Chile*, University of Texas at Austin,Diss.; Nicki Clark 1993 *The Estuquiña Textile Tradition: Cultural Pattering in Late Prehistoric Fabrics, Moquegua, far southern Peru*. Dissertation, Washington Univeristy, St.Louis, MO. UMI, Ann Arbor; V. Cassman. 2000 "Prehistoric Andean Ethnicity and Status: The Textile Evidence: in P. B. Drooker and I. D. Webster, eds. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. The University of Utah Press: Salt Lake City pp 253-266; M. Sanchez Young 2004 *Tiwanaku Ancestors of the Inca* Denver Art Museum. Lincoln: University of Nebraska Press, especially the discussion in catalogue entry for "Trapezoidal tunic" Pp 50-53; W. Minkes 2005 *Wrapping the Dead*. University of Leiden, Leiden.
[3] See for example, P. Goldstein 2005 *Andean Diaspora: The Tiwanaku Colonies and the Origins of South American Empire* Gainesville: University Press of Florida
[4] MMA 2000.160.25
[5] In 1998, the Metropolitan received the John B. Elliott Bequest that included, among other items, approximately 296 ethnographic textiles from Peru, Bolivia and Chile, as well as basketry, beadwork and shell ornaments from the Amazon, Indonesia and Africa.
[6] The garment is fifty-five and one half inches in width at the top, across the shoulder-line, tapering to thirty-nine and one half inches at the lower edge.
[7] Material and Technical information:
Dimensions 35 ¼"H x 55 ½" W,
Materials: Camelid hair, feathers, *Furcroya*.
Weave: Warp-faced plain weave with discontinuous warp and warp-float patterning [in 3 span float alignment] Discontinuous warp yarns are dovetailed around a scaffolding weft, woven with two weft shuttles.
Warp yarns: red, purple, green, white, blue, yellow camelid hair: 48-72 per inch. /\ . Weft: dark brown camelid hair (vicuna or alpaca) /\ 16 per inch.
Embroidery: brown camelid used single / and also /\. Four Feather clusters: One is tied with Camelid hair cord and three are *Furcoya* –type fiber cord.

followed by pattern stripes composed of a white zig-zag and scroll design. Lower edges have overcast stitching that covers a heavy loom cord.

The materials of the garment consist of high quality, silky-fine camelid hair yarns, likely from alpaca and vicuna.[8] The fine quality of the materials composing the textile resulted in a garment that has a very soft feel and is surprisingly lightweight, given its large size. The colors, including red, purple, yellow, blue, green, white in the warp and brown in the weft, are made of various naturally pigmented fibers and dyed colors.[9]

The textile was created with several different weaving structures and techniques. The main body was woven in a warp-faced plain weave, with color areas formed through the use of discontinuous warps (and continuous wefts). The zig-zag design across the chest was also created with discontinuous warps. The narrow stripes along the side edges, in contrast, are formed of *continuous* warps in warp-faced plain weave patterning composed as complementary warp-floats. Fig.2.

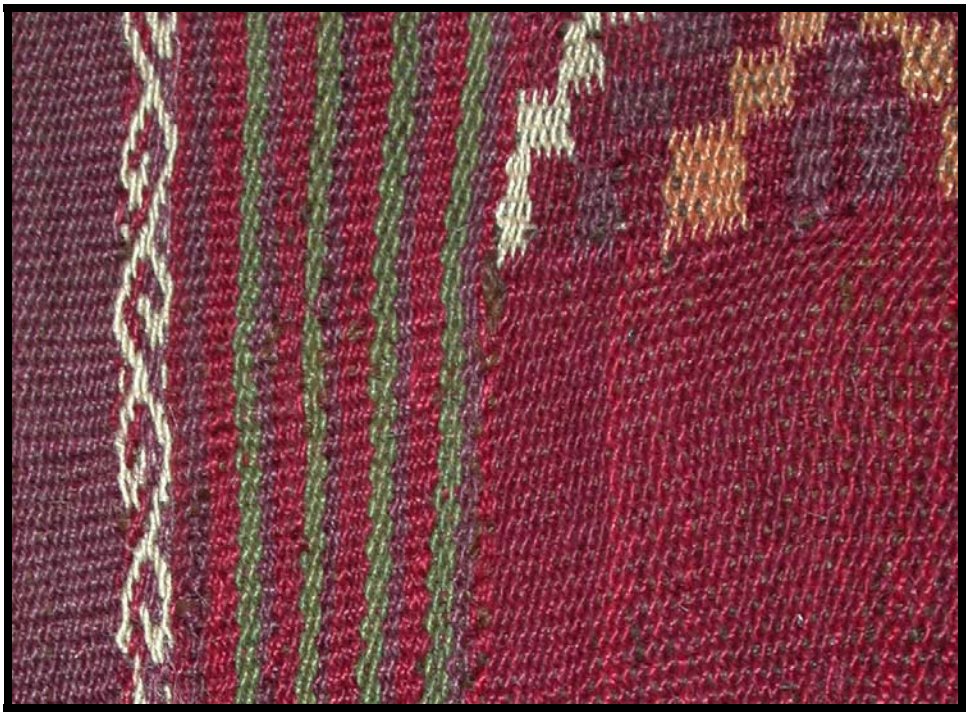

Figure 2. *Detail, MMA tunic, showing discontinuous and continuous warp areas. (Photo: author.)*

[8] All yarns are Z-spun and S-plied, although the spinning of the warp has an S-spun and S-plyed appearance. This is due to the additional over-twist of the yarn typical of warp-faced fabrics from the region. Overspun yarns are typical of highland warp faced weaving. This is an adaptation that developed so that the yarns retain some flexibility to stretch, as needed, during the tautly held tension of the staked ground loom that was used for warp-faced and warp-patterned weaving. See Chris Franquemont 1984 Chinchero Pallys: An Ethnic Code. *The Junius B. Bird Conference on Andean Textiles, April 7th-8th, 1984.* Washington, D.C. The Textile Museum; Grace Godell 1968 "A Study of Andean Spinning in the Cuzco Region" *Textile Museum Journal*, vol 11 no. 3 pp. 2-8; and Amy Oakland, 1997 "Weaving in a High Land: A Continuous Tradition" in *Traditional Textiles of the Andes* ed. by L. Meisch, Fine Arts Museum of San Francisco.

[9] Both the red and purple colors were dyed solely with cochineal, the Andean insect *Dactylopius coccus*. Scientific analysis conducted at the Met by Research Scientist Nobuko Shibayama, June 2008.

Creating the shape of the garment

How was this unusual garment made? The shape of the garment was clearly formed through the weaving process, as opposed to some type of cutting and tailoring. From a weaver's perspective, the creating of these shaped garments entails various diversions from standard warp-faced weaving practices in the following ways:

1) Creating a garment that has a shoulder line that is wider than the lower edge.
2) Creating a garment where the shoulder area is curved downwards rather than straight
3) Creating a lower edge that is partially curved upwards rather than straight

The technical features of the garment provide clues as to how the weaver achieved the shape. Some of the features begin in the warping process, others are influenced by the loom type and still others involve the weaver's manipulation of the warps and wefts while weaving to achieve this complex shape. Additional questions include whether the garment had been woven in one or two pieces and how was that achieved?

Discontinuous Warps

The overall garment was woven with discontinuous warps (and continuous wefts.) [10] This weaving method enabled both the creation of the color block design and the garment's shape. Discontinuous warp (and weft) weaving is unique to the Andes and has a long tradition on the south Coast of Peru. In the earliest examples, some from around 300 B.C., the technique was used to create generally balanced or only slightly warp predominant fabrics with solid color areas. [11] As the technique migrated to highland areas where warp-faced weaving was the cultural norm, it was adapted to produce fabrics where only the warp was discontinuous.

To create the discontinuous warp fabric, the color changes must be established prior to weaving, during the warping process. For traditional fabrics, warping involves measuring out one continuous yarn, back and forth across the loom bars or warping mechanism for the entire width of the cloth. The yarn could change, depending on the color—for example, to create a stripe—but all yarns would span the entire length of the finished cloth. For discontinuous warps, the yarns only travel part way, and only where needed for the particular color block. The point at which the color changes requires some anchoring device—referred to as a scaffold—to hold the yarn in place as it returns in its pathway, while maintaining the proper tension. The position of the scaffolding elements for the MMA checkerboard garment would have been located at the points of horizontal color change along the warp. [12] The use of scaffolding enabled the weaver to change the color of the warp, in order to create the color blocks for the design: It would also have

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[10] Since the fabric is warp-faced, the color of the weft yarn is not visible as it travels side to side across the entire width of the fabric.

[11] See Anna Gayton, "Early Paracas Textiles from Yauca, Peru" Archaeology 14, 1961, pp 117-121. See also E. Phipps (1988) *Discontinuous Warp Weaving in the Andes* Master's Thesis Columbia University and Renata Strelow 1996 Peruvian textiles with discontinuous warp *Veröffentlichungen des Museums für Völkerkunde* ; n.F., 61. Abteilung Amerikanische Archäologie, 10 Berlin.

[12] Assuming that the MMA garment was made of one single fabric, folded at the shoulders, the pattern of six color changes along the warp would require a set of six scaffold elements to create the checkerboard. For the front and back sides of the garment, there would have been three scaffolded sections for each side. For the central zigzag design section, across the breast, the number of scaffold elements increases, to approximately one inch intervals, with 8 color sections, each requiring one scaffold. This would be repeated for the back.

served as the anchoring point for selectively adding additional warps to increase the width of the garment, forming its shape.

Expanding the Width

Scholars have recognized that some trapezoidally shaped garments have been made through augmentation of the warp yarns at strategic positions.[13] Using a scaffold as a stepping-off point, yarns can be incrementally added to sequentially enlarge and expand the upper portions of the garment. Experienced weavers knew how many yarns to increase at each stage, and where they needed to be increased, in order to create the desired shape of the garment.

In the MMA piece, these increases are confined to the color blocks, so that the augmentation of the warps is masked by the checkerboard design, while creating the subtle shape change. For example, in one purple section in the lower position of the garment, the purple warp yarn may travel back and forth for 25 passes over one inch. When the color changes to red, there may be 35 passes. Then a third increase would occur with the next purple, at 55. This helps us to understand how the trapezoidal shape was formed through the measured and periodic increase in the width of the garments: but tunics with arced curves require additional consideration.

Creating the Lower Edge Bow

When we look at the curve of the lower edge in the MMA tunic, it is possible to see that the shape is caused not just through distortion or tension of the yarns, but was formed by the fact that the warp yarns in the central area of the tunic are slightly longer than those at the sides. Here, the weft yarns do not pass across the entire width of the garment, but turn back periodically, to build up the area (Fig. 3). The first lower five or six weft passes are continuous selvage to selvage, yet follow the curved path of the lower edge: then sequentially, rows are built up around the curve in the center, by turning back into the next shed as the curve increases, to fill in the gap and take up the slack and tension differential.

Figure 3. *Detail, MMA tunic, showing lower edge curve with wefts turning mid-way. (Photo: author.)*

As the weaver works up to the chest area where the counter curve or arc begins, wefts again form partial passes across the whole width of the garment, and return near the edges, to increase the

[13] See note 1.

volume. The build-up that is visible through tracing these weft movements indicates that the weaver intentionally created this shape, on the loom. Some trapezoidal tunics—especially those with straight shoulder lines-- may have been woven as two separate pieces, and joined together at the shoulder. Others—and perhaps most-- were woven as a single unit. For our Met garment, because the side sections have continuous warps, front to back, I believe it must have been woven as one piece.

Question of Circular Warping or Straight Warping

The fact that the MMA camisa was woven in one shaped piece and particularly with the feature of the downward arc of the shoulder lines, it would seem to be unlikely, if not impossible, that the fabric had been woven with the warp yarns fully extended out on the loom, as is the expected method (and still used by weavers today.) This leads to my proposition that the warp yarns may had been prepared in a modified circular manner, so that the garment, woven in one piece, could have been woven with both its curved and counter-curved shapes. Oakland has documented the use of a circular warp used for a slightly different type of weaving—tapestry-woven bags—from San Pedro Atacama, of Tiahuanaco design, demonstrating that this method was in use in the region. [14] I believe this warrants further exploration to understand its technical and cultural significance.

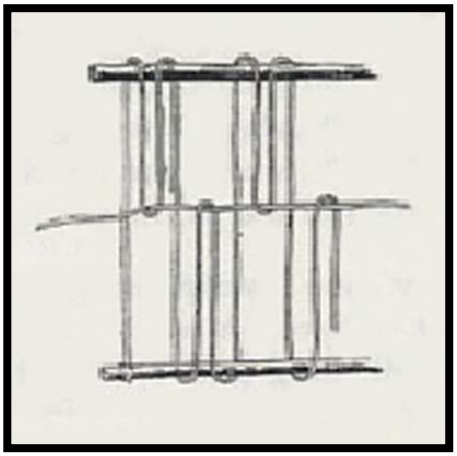

Figure 4 (left). *Warping method used by Amazonian and North American native weavers. (After R. Olson, 1929.)*
Figure 5 (right). *Lengua woman working on a tubular cloth. (After M. Hald, 1962.)*

The use of circular warps to create wide garments throughout the Americas has been documented. Native weaving traditions of North America utilizing this warping process, for example, have been discussed in relation to earlier occurrences in the Amazonian regions.[15] Additionally, M. Hald, examines a large garment from the eastern section of Bolivia in the Ethnographic Museum in Stockholm and traces the circular warping method used by the Chiriguano Indians. [16] Here, rather than forming a continuous spiral, the yarns turn around at the

[14] She notes that the terminal areas of a slightly trapezoidal-shaped coca bag that are located at the wider central part of the bag may be accounted for as resulting from a similar weaving process. Oakland Diss pg. 155-157.
[15] Ronald Olson "The Possible Middle American Origin of Northwest Coast Weaving." *American Anthropologist*, New Series, Vol.31, No. 1 (Jan-March, 1929) pp.114-121
[16] Margrethe Hald *An Unfinished Tubular Fabric from the Chiriguano Indians, Bolivia. Ethnographical Museum of Sweden, Stockholm, Monograph Series Publication* No. 7 Stockholm, 1962 Also W. Barbrooke Grubb, 1911 *An*

loom bar and reverse direction **(**Fig. 4). Upon completion of the weaving, the loom bar would be removed and the result would not be a circular or tubular cloth, but rather a cloth of double length. She includes an historic field photograph of a wide upright loom used to produce this garment, (Fig. 5) a type of loom that could have been used for the weaving of the MMA shaped garment. If the straight loom bar is substituted with one that may flex or even with a heavy cord—present in all examples of these garments-- then it would be possible to extend and expand the outer shape of the entire warped unit, prior to and during the weaving process.

Conclusions

How exactly these wide, trapezoidally-shaped and three-dimensionally constructed garments were made is still somewhat of a mystery. There are a number of different types, and the extreme shape and arced form compounds the difficulty to weave them. Modest alterations of the traditional rectangular format could have been achieved in relatively simple ways by skilled weavers through the manipulation of tension as the weaving proceeded. The more extreme forms resulting in trapezoidal shapes required additions of yarns to the cloth, mostly before the weaving process. Some yarns may also have been added during the weaving process, and even a few may be added after the weaving process, to adjust the final shape.

The combined achievements of a weaver who understands the physics and dynamics needed to create non-linear shapes, while producing exquisitely fine and even weaving speaks to the high degree of skill practiced by these special artisans. This appears to have been a unique skill, confined to the weavers of the southern region of the Andes-- although with further study, we may find that the loom treatment and weaving style migrated from Eastern zones of the Andes, perhaps at the time when the colonists from Tiahuanaco, Bolivia came to the region. This technical focus enables a broader look at the region, and as a result, we may need to look to outside cultural influences to explain the unique appearance of something that has up until now, been considered to be a very local style.

THE END

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unknown people in an unknown land : an account of the life and customs of the Lengua Indians of the Paraguayan Chaco, with adventures and experiences met with during twenty years' pioneering and exploration amongst them. Seely, London.