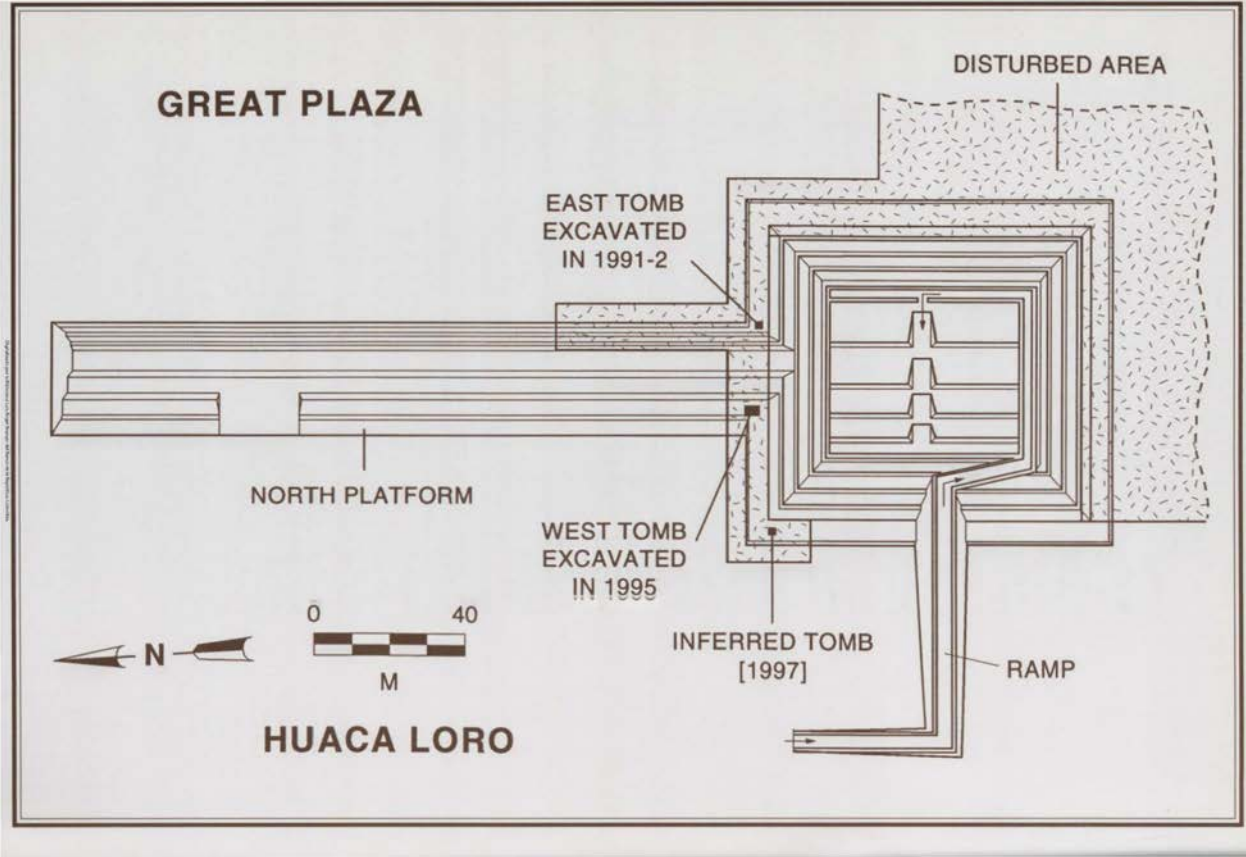
GREAT PLAZA
DISTURBED AREA
EAST TOMB
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HUACA LORO

Sican metallurgy and its cross-craft relationships

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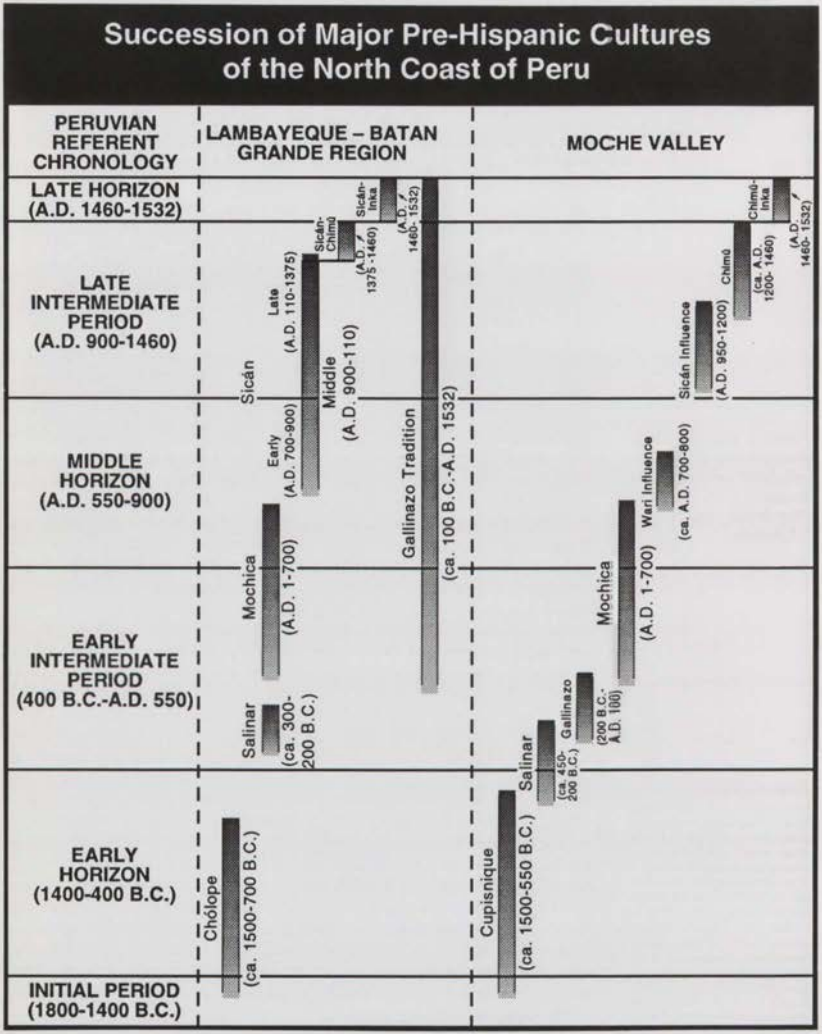
Figure 3. Reconstruction drawing of the Huaca Loro truncated pyramid with locations of the East and West tombs. Drawing by I. Shimada.

Abstract: Metal artifacts are studied most commonly in isolation from other craft goods. Holistic examination of grave goods from three Middle Sicán elite shafttombs recently excavated at the site of Sicán on the northern coast of Peru shows that the production of precious metal items is best understood as one component of an integrated, sumptuary goods production system that also included pottery making, lapidary and weaving. This paper illustrates how these different crafts were closely intertwined from design and manufacture to use of products and that current approaches to ancient crafts that focus on a single medium do not properly illuminate such relationships. Additional workshop excavations and a more flexible interpretive framework are needed as well as further exploration of the conditions under which different inter- or multi-craft production takes place.

Resumen: Es común que los artefactos de metal se estudien separados de otros bienes. El examen holístico del ajuar funerario de tres tumbas de tiro de la élite de Sicán Medio, recientemente excavadas en el sitio Sicán de la costa norte peruana, muestra que la producción de objetos de metales preciosos se entiende mejor como un componente de un sistema integrado de producción de bienes suntuarios, que también incluyó elaboración de cerámica, textiles y lapidaria. Este artículo ilustra cómo estos objetos estuvieron intimamente relacionados en cuanto al diseño, manufactura y uso, y cómo las aproximaciones usuales a la orfebrería, que ls consideran como un medio singular, no aclaran propiamente tales interrelaciones. Otras excavaciones en sitios de trabajo y esquemas interpretativos más flexibles son necesarios, como también futuras exploraciones sobre las condiciones bajo las que la producción inter o multi manufacturas tuvo lugar.

Acknowledgements:
I am indebted to members of the Sicán Archaeological Project as the paper draws upon the results of many years' teamwork. I am grateful for the useful comments of Jo Ann Griffin, Prudence Rice, and Melody Shimada. My thanks also to César Samillán and Yutaka Yoshii, the illustrator and photographer of the project, respectively. Lastly, much of the work relevant to this paper was conducted with the support of two grants from the Shibusawa Ethnological Foundation, Tokyo.



Some 10 years ago, I discovered a series of 3000 to 2700-year old ceramic kilns in the Poma Archaeological and Ecological Reserve in the mid-La Leche Valley on the Peruvian north coast. I was struck by the overall similarity of their design and form to later Middle Sicán (A.D. 900-1100; see Table 1) arsenical bronze smelting furnaces (Shimada et al. 1990, 1994, in press). Although there were differences in size and construction material, both had a carefully lined, simple bowl-shaped chamber formed by arching side walls and a prominent "chimney" that created thermal convection and increased updraft, respectively. Their similarities should not surprise us as both were intended to attain and sustain high temperatures and certain atmospheric conditions to effect the desired physical and chemical transformation of the contents. I wondered if the technological understanding gained in earlier ceramic firing could have contributed to the development of early smelting in the Andes during the first millennium B.C.

This paper is, in essence, an outgrowth of the above inference that there was important interplay among crafts that were practiced concurrently and perhaps in close proximity. Over the past few decades the scope of archaeological studies of craft production and technology has expanded under the banner of the "social construction of technology" (e.g., Bijker et al. 1987; Dobres and Hoffman 1994; Lemonnier 1986, 1992, 1993; Pfaffenberger 1992; see earlier thoughts in Bergsøe 1937; Lechtman 1977, 1984a,b; Smith 1965, 1970, 1975). Traditional technological studies have been challenged as being overly influenced by modern western economic thinking that emphasizes a functionalist, efficiency-minded solution and production aimed toward consumption and material abundance. Instead, these studies have focused on the social and ideological foundations of technological innovation, use and spread.

Concurrently, there has been a notable increase in studies concerned with the organization of production, including the associated technology and procurement and utilization of raw materials (e.g., Clark and Parry 1990; Costin 1991, 1996; Costin and Hagstrum 1995; Feinman 1985; D'Altroy and Bishop 1990; Nelson 1991; Peacock 1981; Rice 1981, 1987). However, proposed organizational models have been predominantly based on ceramics and insights from ethnoarchaeological studies. Studies based on excavations of production sites remain rare (e.g., Shimada [ed.] 1994, in press) and even data from those studies tend to be interpreted in terms of models built on analysis of finished products and ethnoarchaeology, rather than those resulting from internal analysis.

In addition, common conceptions of and approaches to ancient technology and craft production are compartmentalized and medium-based; i.e., studies are conducted within confines of a specific medium such as ceramics, metallurgy or an even more specific domain (e.g., blackware or base metal). These studies often do not consider the relationship of the craft under study to other crafts that were being practiced concurrently at local or regional level (Shimada in press).

An expanded version of a paper presented at the Symposium, «La Metalurgia Prehispánica de América» organized by Clemencia Plazas and Roberto Lleras, International Congress of Americanists, Pontificia Universidad Católica del Ecuador, Quito, Ecuador, July 7th - 11th, 1997. Do not cite without permission of the author.

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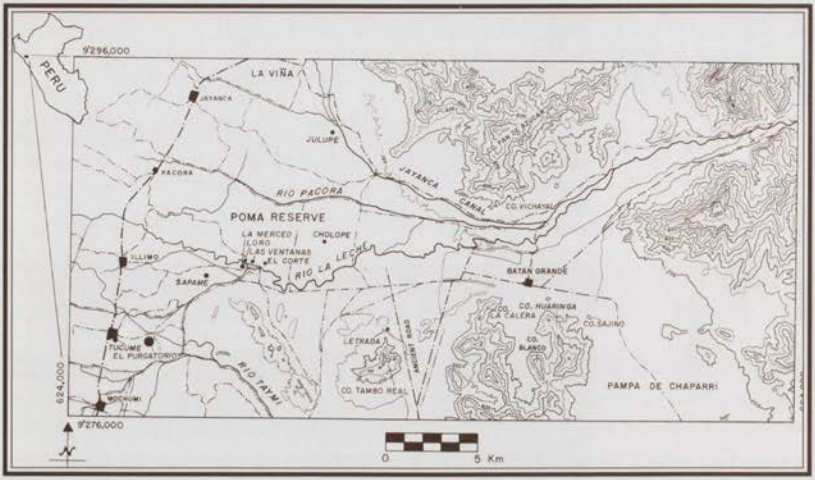


Figure 1. Map of the Batán Grande region in the mid-La Leche valley on the north coast of Peru. The site of Sicán is situated near the intake of the Túcume canal off the La Leche river. Drawing by I. Shimada.

Cross-craft interaction, the general term that subsumes multi- and inter-craft interplay, as well as their material and organizational consequences, has received little attention in archaeology. Investigation has been hampered by the medium-specific approach and conception that pervade current craft production studies. This situation is understandable given the complexity and quantity of information to be learned and sought, our academic formation, and scarcity of research where multiple crafts are investigated in parallel and sufficient depth. An important additional factor is that, more often than not, examples of composite artifacts have been looted from graves and thus lack contextual data and the confidence that the exisiting components are complete or original (Carcedo and Shimada 1985; Shimada 1994b).

Yet, material culture is replete with examples of what are in reality composites of products, knowledge and/or techniques derived from what are analytically treated as distinct crafts, such as ceramics, woodworking, lapidary, metallurgy, and weaving. Andean examples include objects commonly subsumed under the rubric of ritual paraphernalia or status items, such as Sicán and Chimú ponchos with gold plaques sewn on, and Mochica metal masks with inlaid shell eyes, ears and teeth. P. Lyon (1991) suggests that the practice of demarcating each colored area of Pukara polychrome ceramics with broad

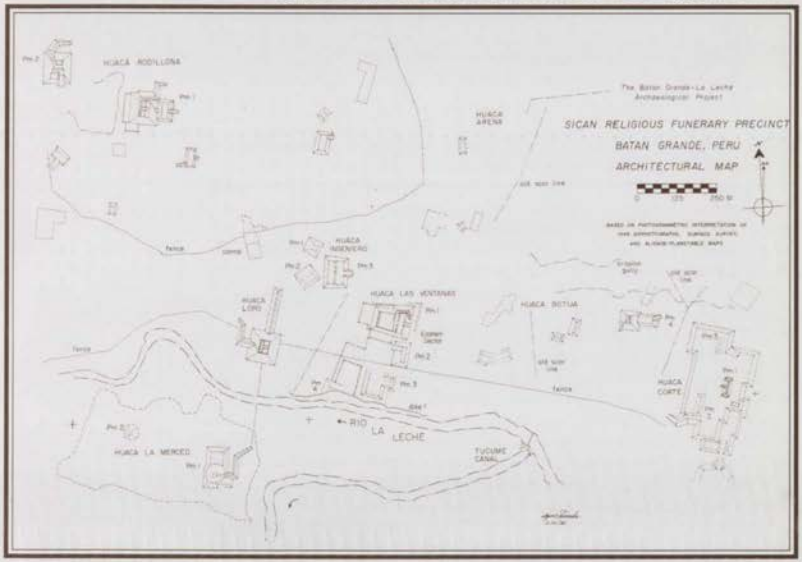
incisions may have been adopted from the incision and/or champlevé techniques extensively used in Pukara's well-developed stone carving tradition. The latter produced rectangular stone slabs with flat relief carvings that, in turn, may well have influenced or been stimulated by textiles.

In this paper, I am concerned with issues of cross-craft interaction; i.e., how a given product integrated materials, knowledge and/or techniques from various crafts to achieve desired effects and properties, and what such investigation reveals about craft production and its products in general.

Data base

The relevant data for this paper derive from the ongoing Sicán Archaeological Project, which, since 1978, has explored the historical trajectory and material, organizational, and ideological characteristics of the Sicán culture within its regional context (e.g., Shimada 1980, 1990, 1995). The "Sicán" (also known as Lambayeque) culture, a highly distinct and influential entity centered in the Lambayeque region of the northern North Coast, emerged around

Figure 2. Major architecture at the site of Sicán. Drawing by I. Shimada.



A.D. 750 following the demise of the northern Mochica (or Moche; Shimada 1990, 1994a). During the middle or "classic" phase dating to A.D. 900-1100, its polity, centered at the site of Sicán in the mid-La Leche valley (Figs. 1, 2), established political and religious dominance over a 400-km stretch of the Peruvian coast, from at least the Chira valley in the north through the Chicama in the south. In fact, the Middle Sicán style as represented by mold-made, black, single-spout bottles bearing the diagnostic icon of the Sicán Deity, spread rapidly and extensively over a much larger area, constituting the only coastal "horizon style" known to date. The Late Sicán polity with its new capital at El Purgatorio (or Túcume Viejo) remained viable until ca. A.D. 1375-1400 when it was conquered by the expanding Chimú Kingdom (Table 1).

Holistic understanding of Sicán ceramic and metallurgical production through sustained, interdisciplinary investigation has been a basic, long-term aim of the Sicán Archaeological Project; i.e., reconstruction of the technology and organization of these crafts at all stages of production and to define the meaning and roles of their products (e.g., Cleland and Shimada 1994, in press; Merkel et al. 1994; Shimada 1985, 1994b; Shimada et al. 1982; Shimada and Griffin 1994; Shimada and Merkel 1991). Much of the relevant data have been derived from surveys and/or excavations of various Sicán metallurgical (both arsenical copper and gold alloy) and ceramic production sites. Our investigation of other crafts such as weaving and lapidary has lagged behind largely due the paucity of relevant materials and sites. However, ongoing investigations following the recent discoveries of cotton cloth and massive quantities of diverse beads in Middle Sicán elite tombs (e.g., Shimada et al. 1997) should redress the latter.

Excavations of three Middle Sicán elite tombs at or near the monumental adobe-and-fill truncated pyramids of Huaca Loro and Huaca Las Ventanas (Fig. 2) in 1991-2 and 1995 yielded specific examples of cross-craft interplay considered in this paper. These excavations are part of an interdisciplinary study of Middle Sicán funerary practices and grave goods aimed at the clarification of Sicán social organization that began in 1990 (e.g., Shimada 1995). To date, tombs of varied size, shape and contexts have been sampled at the site of Sicán.

Two deep shafttombs, designated here as the East (excavated in 1991-2) and West (excavated in 1995) tombs, had been symmetrically placed at the juncture of the Huaca Loro temple body and its auxiliary 150-m long platform (Fig. 3). The East Tomb is a good example of a shafttomb with niches or lateral chambers (also known as a boot-shaped shafttomb), a type widespread in the northern Andes and western Mexico (e.g., Chaves and Puerta 1980; Disselhoff 1971; Long 1966, 1967; Meighan 1969; Meighan and Nicholson 1989; Meyers et al. 1975; Uhle 1922). The 3 x 3 m vertical shaft descends some 10 m below surface to a burial chamber with seven wall niches. Two niches and the burial chamber were packed with ca. 1.2 tons of diverse grave goods and four individuals (two adult females, a juvenile and an infant) around a centrally

Figure 4. Reconstruction drawing of the organization and content of the East Tomb. The superimposed grave goods were compacted to a thickness of less than a meter. Drawing by I. Shimada and C. Samillán.

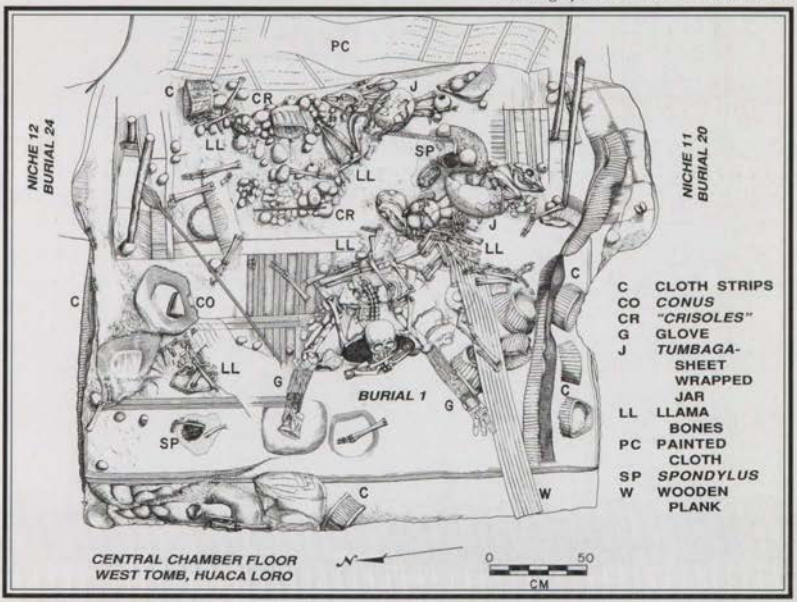
placed male personage about 40-45 years old (Shimada 1995; Shimada and Merkel 1993; Shimada and Montenegro 1993; Fig. 4). Placement of grave goods and accompanying individuals was carefully orchestrated: the inverted body of the principal personage was underlain by a mantle with some 2000 small gold foil squares sewn on. It either held or was covered by a pair of large *tumbaga* (used here to mean gold-silver-copper alloys that are less than 10-karat [less than 40%] gold) ceremonial gloves, one of which held a gold-silver rattle-beaker and the other a wooden staff with gold and *tumbaga* ornamentation, a pair of gold shin guards, a *tumi* (knife with a semi-circular blade), a series of gold headdresses, a standard with various gold trimmings, and six pairs of large gold ear spools, among other items. The individual's face was covered by a large gold face mask and three pairs of gold ear ornaments. His chest was covered with an amber pectoral and at least four layers of beads of *Spondylus*, amethyst, sodalite, turquoise, and other minerals. Above and apart from the principal personage were other items, including a disassembled litter, 179 whole *Spondylus princeps* and 141 *Conus fergusoni* shells, four large clusters of diverse beads (ca. 75 kg), 489 cast arsenical copper implements bundled into 13 groups (ca. 200 kg), five piles of *tumbaga* scraps (ca. 500 kg), and an estimated 1500 bundles of *naipes* (arsenical bronze sheet objects thought to have been used as primitive currency; Shimada

Photograph 1: Panoramic view of the West Tomb showing its two tier construction Antechamber and Central Chamber). Photograph by I. Shimada.

1985; Fig. 4). At the northwest corner of the chamber was a box containing some 60 major high-karat gold objects of ritual and personal nature (e.g., rattles, crowns, head bands, head ornaments in the form of gold feathers and *tumis;* Gordus et al. 1995; Gordus and Shimada 1994; Shimada and Griffin 1994).

The West Tomb had a rectangular plan and nested, two-tier construction, consisting of a 10 x 6 m Antechamber with 10 niches and 3 x 3 m Central Chamber with its own pair of niches at ca. 12 and 15 m below surface, respectively (Photograph 1). The Antechamber contained 21 bodies, mostly of young adult females, 3 in niches and the rest packed tightly in 12 rectangular floor pits. The Central Chamber was organized around a centrally situated, male personage (ca. 30-35 years old; K. Mine 1997, personal communication) and each of the two niches contained one adult female. Diverse grave goods such as tropical shells, ceramics, and wooden scepters, covered the floor around the personage. Overlying the female body in the

Figure 5. Grave goods found on the Central Chamber floor surrounding the seated body of the principal personage, Huaca Loro West Tomb. Drawing by I. Shimada and C. Samillán.



north niche was a cache of shell beads, *tumbaga* and gold personal ornaments and ritual paraphernalia. The range and quantity of metal objects in this tomb pale in comparison with those of the East Tomb; an estimated 3.5 kg of arsenical bronze (i.e., *naipes*,) and *tumbaga* objects, and only a handful of small high-karat gold ornaments. At the same time, the Central Chamber of the West Tomb contained traces of nine rolls of cloth as well as eight heads and limbs of camelids representing at least 25 individuals, while the Antechamber floor had at least three large painted cloths with *tumbaga* sheet backing and two complete camelid skeletons (Shimada and Shimada 1997).

The third tomb was situated south of the Las Ventanas temple. In form, the tomb was an inverted step-pyramid with its square base (i.e., "mouth") measuring ca. 15 m to a side and depth reaching ca. 12.5 m below surface. Its eastern half had been looted but the intact western side revealed a series of mud-coated ledges (from ca. 8 m below surface to the bottom of the tomb) carved out of the compacted sand matrix on which offerings and burials were placed. We did not find a central personage as in the case of the Huaca Loro tombs. Three complete and six partial bodies, all relatively young adult females, were found near the bottom of the tomb. In addition, we found caches of diverse ceramic vessels, a large cluster of shell beads, numerous packages of *naipes*, the heads and articulated lower limbs of llamas, *tumbaga* bells, arsenical copper implements, amber beads, and numerous bundles of *naipes* at or near the tomb bottom (Fig. 5). High-karat gold objects were conspicuously absent. Probably the most striking feature of the tomb was the way much of its interior surface had been lined with multiple layers (in some spots over 20 distinct layers) of painted cotton cloth carefully pasted on *tumbaga* sheets (Shimada 1995).

Overall, the diverse array and abundant quantities of craft goods from securely documented contexts, together with background information accumulated since 1978, form the data base of this paper.

Cross-craft relationships : middle sican examples

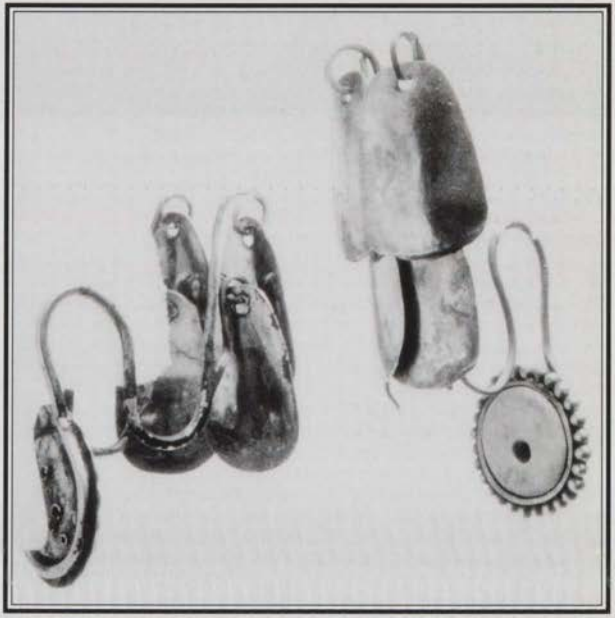
Metal-Lapidary Linkage

Several examples of gold alloy objects with shell and/or mineral "insets" were found in the Huaca Loro East and West Tombs, including nose clips, ear spools, a large mask, and a forehead ornament with sculptural bat-head (Photographs 2, 3). The term inset is used here as these examples are not, strictly speaking, inlay, which implies pieces of mineral or other materials set into a surface to create a design that is level with that surface; in these examples, mineral pieces are set into small areas with repousséed edges, creating a new, raised surface (J. Griffin, 1997 personal communication).

Certain important commonalities crosscut variation in size, complexity and inferred usage of these examples. One is that the insets were clearly integral to the original design of these objects. Another shared feature is that most of the insets had been drilled.

The large gold mask that covered the face of the principal personage of the East Tomb (Photograph 3) is a good example of what may be described as "integrated" metalworking and lapidary. The striking, upturned eyes were made to resemble human eyes by combining an alloy and gemstone beads (Shimada and Griffin 1994). A silver-copper alloy represented the "white" of each eye, a large, semi-spherical, drilled amber bead the brownish iris, and a drilled green emerald bead set atop the amber the pupil. The two amber beads were carefully shaped and polished; they were nearly identical in size and shape and perfectly fit their repoussé circular settings.

Photograph 2: A pair of nose clips with perforated turquoise bead insets. They were found on and near the nose of the principal personage of the Huaca Loro East Tomb. Photograph by Y. Yoshii.



Photograph 3: The restored large gold-alloy mask that covered the face of the principal personage of the Huaca Loro East Tomb. Note the elaborately made eyes and earspools. Photograph by Y. Yoshii.

Elsewhere, I have described a pair of ear spools made specifically to be used for this mask (Shimada and Griffin 1994). The back flanges of the earspools were placed on each earlobe and three holes punched through simultaneously. Then, the earspools were fully assembled in situ and the round calcareous insets placed at the frontal center of the earspools. Microscopic examination of fragmented, corroded materials on the ears revealed the fine imprinted parallel striations of perished cloth. Thus, it is likely that cloth pieces were stapled onto the stylized "ears" (symmetrically situated rectangular areas on the sides of the mask), perhaps so that small feathers could be stitched on. The clear imprints of small, trimmed bird feathers that were pasted on (see Figs. 53, 90, 113 in Shimada 1995) are found on other high-karat gold alloy objects recovered from this tomb, including a standard and scepter ornaments. In addition, small white bird feathers were found mixed in one of the aforementioned *tumbaga* sheet scrap piles found inside the East Tomb burial chamber. Scraps are essentially the recyclable byproducts that result from any sheet metalworking (e.g., trimmings that still retain the outline of the cutout pieces) as well as rejects from mishaps in manufacturing. They were most likely collected from workbenches and floors around them.

Overall, it appears that the manufacture of the mask required careful planning, advance procurement and/or concurrent preparation of component parts such as earspools, beads, cloth, and feathers, and participation of varied craftsmen.

At the same time, this elaborate mask is far from being a typical cross-craft example. In fact, the degree of variation in color and/or fit found in matched pairs of artifacts with insets (e.g., ear spools) in general does not suggest lapidary work tailored to specific objects. The Sicán goldsmithing-lapidary relationship will be considered again later.

Metal-Ceramic Relationship

There are various other cross-craft examples in Middle Sicán material culture. J. Muelle (1943) and J. Rondón (1965/6) earlier noted a ridge or fine groove around the circumference near the median point of the spherical body of Middle Sicán single-spout bottles with pedestal bases. This ridge or groove was not related to the manufacture of these vessels, which were largely built with two-piece *vertical* molds. Rondón (1965/6) argued that this feature was an imitation of the "ridges" and lines formed in the manufacture of metal bottles when the two sheetmetal halves forming the the body were mechanically joined on the exterior and interior, respectively (Photograph 4). Given that known Middle Sicán metal objects were fashioned out of gold alloy sheets, the above ceramic imitations are interpreted as reflecting the higher prestige/status value of the gold alloy.

The popular low-relief press-mold decorations on Middle Sicán blackware vessels may have been modeled after identical or more detailed repoussé designs on gold alloy sheet objects such as beakers and plaques. One example is the frontal view standing Sicán Deity with or without accompanying mythical, seated felines or bicephalous serpent with serrated back (Fig. 6).

Further insights into Sicán metal-ceramic relations may be gained by examining funerary context ceramic vessels completely wrapped in *tumbaga* sheetmetal about 0.01 mm in thickness. Electron probe microanalysis of the corroded sheetmetal sample indicates a composition of 17-26% gold, 15-16% silver, 16-43% copper and 0.7% arsenic (the rest is assumed to be corrosion product; Merkel et al. 1995:121). Copper had been depleted from the surface layer some 1 micron thick. This limited depletion is suspected to have resulted from a repeated coldworking-annealing-pickling cycle, and not from intentional depletion (Merkel et al. 1995:121).

All black double-spout and bridge ceramic bottles from the three elite shafttombs excavated thus far at Huaca Las Ventanas and Huaca Loro have had the corroded remains of *tumbaga* sheetmetal still covering the vessels (Fig. 7). In some cases, the organic resin that was used to anchor the sheets is still preserved. Using infrared micro-spectroscopy, Eugene Farrell (1992, personal communication), conservator at the Fogg Art Museum, Harvard

University, identified the adhesive as a mixture of locally abundant *algarrobo (Prosopis pallida)* resin with perhaps some fish-bone-based glue added. In comparison with ceramic bottles excavated from more than 50 Middle Sicán tombs at some 20 sites of different character in and outside of the Lambayeque region (e.g., Guffroy et al. 1989; Shimada 1995), these metal-covered double-spout vessels were well-made, often elaborately decorated, and restricted to the elite shafttombs.

While we earlier thought that sheetmetal covering was restricted to fine, double-spout bottles, two large, off-white, slipped, short-neck jars subsequently found in the Huaca Loro West Tomb were also covered with sheetmetal. One jar was plain, while the other was decorated with modeled creatures (believed to be Pacific crocodiles [*Crocodylus acutus*]) on its shoulder and simple red lines near the base of the neck. In all these cases, the sheetmetal cover effectively obscured the surface finish and decoration.

Metal-Textile Interplay

Another dimension of the complex relationship between metallurgy and other crafts is seen in painted cotton cloth with gilded sheetmetal backing. Excavated Sicán textiles are rare and documented cases are overwhelmingly plain or painted cotton (Shimada 1995:135-139, his Figs. 119-121; also see Flores 1984). Many of the textiles described by Reid (1989) as pertaining to the "Lambayeque style" are woolen (camelid fiber), but when and where they were woven remain uncertain as all of his examples were looted specimens with no provenience information.

Photograph 4: Middle Sicán blackware bottle with median "join" line. Photograph by I. Shimada.

Figure 6: Middle Sicán double-spout bottle still largely covered by *tumbaga* sheets. It was excavated from a large tomb south of the Huaca Las Ventanas temple. Drawing by C. Samillán.

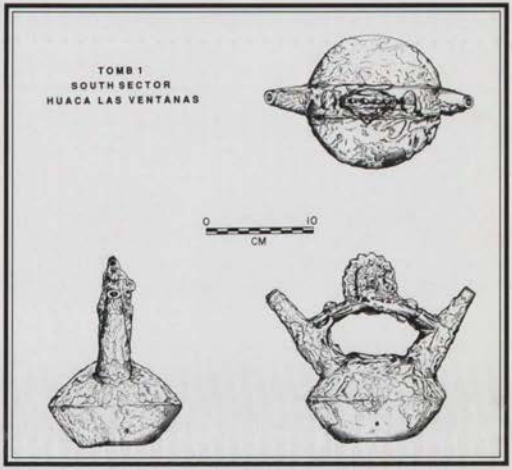


Figure 7: Middle Sicán canteen-sihaped jar with low relief press-molded decoration resembling repoussé decorations on precious metal objects. The jar was among the grave goods of a "commoner" burial excavated near the east base of the Huaca Las Vemtanas temple. Drawing by C. Samillán.

There is no excavated example showing the more complex "structural weaving" pervasive in the southern highlands of Peru (Emery 1966; Lechtman 1984a,b). Sicán painted cloth might be as simple as black line drawing on a white background much as in the tradition of earlier Mochica fineline drawing. Most of the excavated pieces from the site of Sicán have polychrome religious scenes painted on a thin white plaster coating on plain cotton cloth.

The latter examples essentially duplicate murals in rendering, color, and perhaps even themes. They are distinguished from murals by the gilded sheetmetal backing and their relative portability. For example, two nearly identical painted cloths with polychrome rendering of a marine theme had been placed symmetrically in the northeast and northwest corners of the Antechamber floor of the Huaca Loro West Tomb (Photograph 1). The better preserved piece measured 1.15 m by at least 2.55 m and an estimated original length of more than 4 m. A cane lattice support provided rigidity and assured that the cloth was properly stretched. In situ examination by textile conservators, Nobuko Kajitani and Beatriz Miyashiro (1996, personal communication), revealed that the painted surface had been placed face-down

Photograph 5: Painted cloth carefully laid horizontally on a ledge at the southwest corner of the Huaca Las Ventanas tomb ca. 4 meters below surface. Photograph by I. Shimada.

Photograph 6: Close-up view of the cloth illustrated in Photograph 5. Note the edges of standardized *tumbaga* sheets underlying the cloth. Photograph by I. Shimada.

on the floor and that the back had three thin superimposed layers of a black coating, a soft, brown organic substance, and gilded *tumbaga* sheets. Microscopic examination by Kajitani indicated that the brown substance was composed of carefully selected, fine cotton filament. The *tumbaga*, though patchy and fragile, still glittered in the sun when it was excavated. Scattered remnants suggest that much, if not the entire back, of the cloth had been covered with *tumbaga* sheets.

Leaning against the walls of the Central Chamber of the West Tomb were additional painted cloths measuring roughly 3 x 1 m with similar sheetmetal backing. In addition to gridded or diagonal supporting cane frameworks, these cloths also had a substantial vertical wooden pole (5-7 cm in diameter) at each end. Overall, there were at least 8 large painted cloths with sheetmetal backing placed flat on the floor or nearly vertically against the wall faces of the West Tomb.

Better preserved examples of painted cloth with sheetmetal backing come from a shafttomb excavated at Huaca Las Ventanas. A good example was found carefully laid face up on the middle of a ledge at the southwest corner of the tomb about 4 m below the tomb mouth. It was accompanied by a double-spout ceramic bottle wrapped in sheetmetal and an intentionally broken jar. Only the center (ca. 140 x 20 cm) of the cloth (250 x 150 cm) was plastered and painted (Photograph 5), although the entire cloth had been pasted to a sheetmetal backing. The backing consisted of standardized 25 x 12.5 cm metal sheets carefully laid edge to edge (Photograph 6).

The painting showed the Sicán Deity with a *tumi*-knife and trophy head at the center flanked by a red, round "sun" on the right (east) and pale, crescent "moon" on the left (west) - representing what may be called the Sicán "cosmovision" (Photograph 5). An identical painting was found ca. 8 m below surface along with another large (ca. 2.3 x 0.9 m) painting of the Sicán Deity under the arching body of the double-head Sky Serpent flanked on both sides by an opposing pair of seated, mythical felines. Nearly all preserved painted cloths with sheetmetal backing show Sicán religious scenes.

Electron probe microanalysis of four spots on the copper-depleted surface on a corroded sample of *tumbaga* sheet backing of the last cloth gave a range of 22-38% gold, 13-39% silver, and 6-7% copper (Merkel et al. 1995:111). Normalized compositional range is 32-54% gold, 18-58% silver, and 10-27% copper. Metallographic and electron probe microanalysis (McLoughlin 1996; Merkel et al. 1995) reveal that these sheets are similar in composition and manufacture to both the *tumbaga* sheets that wrapped ceramic vessels and the ca. 500 kg of *tumbaga* scrap deposited in the Huaca Loro East Tomb (see Fig. 4; Shimada 1995:93-95; Shimada and Griffin 1994; Shimada and Merkel 1993). For example, wavelength dispersive x-ray spectrometric analysis of a *tumbaga* scrap piece indicates that its surface composition is ca. 28% gold, 25% silver, and 41% copper (the rest assumed to be corrosion products; McLoughlin 1996:70; also see Gordus and Shimada 1994) and that it had been depletion-gilded (McLoughlin 1996:44). The inner portion had been more extensively corroded and compositional data are not available, though, it is most likely that copper was substantially higher in its weight percent than in the outer portion.

The quantity of *tumbaga* sheetmetal scraps documented in the East Tomb not only represents an enormous investment of valued precious metals and manpower, but also reflects the intensity of sheetmetal production and its diverse uses. The intensity of production is also seen in the Huaca Las Ventanas tomb where the total estimated surface area of cloth with *tumbaga* sheet backing used to line its interior alone exceeded 100 m^2. Additionally, various types of objects in the Huaca Loro East Tomb were sheetmetal-wrapped.

Discussion

This paper presented specific Middle Sicán examples of combined materials, knowledge, and/or techniques of various crafts in the production and/or use of sumptuary goods. The examples also illustrated the divergent ways in which multiple crafts related to each other and the different organizational implications they carry.

Ceramic or metal objects with stone or shell insets are "multi-craft" products that simply utilized finished products from one or more crafts in the final assembly of items being manufactured. In many cases it is doubtful the

inset pieces were specifically made for the metal objects in question. On the other hand, the high-karat gold mask from the Huaca Loro East Tomb constitutes our strongest case for "inter-craft" interaction, a continuous and creative interplay, whereby "hardware" (e.g., raw materials and tools) and "software" (e.g., technical knowledge) both played an active role from designing and manufacture. The amber pieces, for example, were matched in color and carefully shaped to be a part of the complex eye construction.

Cross-craft products may be more common than imagined. For example, examination of Middle Sicán double-spout blackware bottles in the Brüning Museum (Lambayeque) and the National Museum of Anthropology, Archaeology and History (Lima) by Kate Cleland (1994, personal communication) and I revealed some vessels with traces of *tumbaga* sheet wrapping intentionally or unintentionally removed during cleaning. It is worth reiterating here the finding from the Huaca Loro West Tomb that *tumbaga* sheetmetal wrapping was not restricted to fine blackware vessels but includes utilitarian jars.

In addition, some effects of cross-craft interaction may not be readily recognizable or even have been intended or foreseen (Shimada n.d.). The press-molded relief decorations on ceramic vessels that rapidly spread throughout the northern Peruvian coast during late Middle Horizon (e.g., Menzel 1977; Schaedel 1979) may have started as an effective way to reproduce the chasing-repoussé effects found on the more prestigious, precious metal objects. Similarly, some graphitized Cupisnique vessels may well have resulted from an effort to reproduce the jet-black metallic sheen of rare, carved Cupisnique anthracite cups. A thin layer of graphite results when carbon deposited on ceramic vessels being fired under a reducing atmosphere is heated sufficiently high to crystallize (U. Wagner, personal communication, 1997). In these two examples, efforts to reproduce the appearance of high-status items in one medium may have brought about important (albeit unintentional) technical and technological developments in another medium.

What do the cases described earlier tell us of the organization of relevant crafts? For example, did lapidarists and goldsmiths work in close coordination in a single workshop in manufacturing gold-alloy objects with mineral or shell insets? What can be said about their functional interdependence?

We will address these questions in the process of answering another question: Why are the shell and mineral insets found in Sicán metal objects (or, for that matter, in those of other prehispanic Andean cultures) so often *drilled*? In the case of the eye of the Sicán mask, a gold wire passed through both the amber and emerald. However, there is no apparent reason for perforations in the amber eyes of the *tumbaga* mask covering the face of the principal personage of the Huaca Loro West Tomb (Photograph 7) or the turquoise inlay of a nose ornament from the East Tomb (Photograph 2).

The widespread use of drilled beads as insets illuminates the Sicán goldsmithing-lapidary relationship. Examination of four large bead clusters found in the East Tomb of Huaca Loro, together weighing ca. 75 kg and composed of hundreds of thousand of beads (Photograph 8), provides important insights. These clusters differ in the identity of the most abundant or prominent bead - either shell (*Spondylus*), sodalite, or turquoise. Other beads were fashioned out of agate (reddish brown), amber, calcareous minerals including calcite, and fluorite (white and pale green). The largest amethyst, quartz crystal, and sodalite beads are roughly the size and shape of small chicken eggs (ca. 3 x 5 cm). Many large turquoise pieces are irregular in shape and though perforated and polished, appear to be pre-forms. At the same time, numerous sodalite and turquoise beads are relatively small and tabular (ca. 1-2 cm to a side and 1.5 to 3 mm in thickness), well suited to be used as insets. Shell beads are invariably disks having a thickness and diameter of ca. 0.3 to 2 mm and 1.3 to 20 mm, respectively.

Photograph 7: *Tumbaga* mask that covered the face of the principal personage of the Huaca Loro West Tomb. Note the differences in the eyes and overall construction in comparison with the mask shown in photograph 3. Photograph by I. Shimada.

Photograph 8. A bead cluster found in Niche 1 in the Huaca Loro East Tomb that shows how sodalite, shell, amber and quartz beads were strung and grouped together by size, shape and material. Photograph by Y. Yoshii.

Constituent beads were placed in an orderly manner to form a coherent cluster. For example, the largest cluster featuring predominantly shell and amethyst beads shows a concentric ring layout. The adjacent cluster has rows of sodalite and quartz beads forming cross-sectional loops (Photograph 8). In fact, short segments of the cotton string that linked these beads were found in the latter. In other words, these clusters consist of carefully piled strings of beads sorted by material and to a lesser degree by size and shape.

In the modern jewelry trade, these sorts of strung beads are called "falls" (J. Griffin, 1997, personal communication). It is how beads are sorted and transported. We suggest that the shell and mineral beads used in goldsmithing were imported on strings pre-formed, polished, and drilled; beads of appropriate size and shape were then selected from large caches of beads, and perhaps given some minor subsequent modifications. Insets such as shell, turquoise (Mohs' scale of 5-6) and sodalite (5.5-6) are all relatively soft and would have been much easier to reshape to fit the setting than the converse.

To date, we have not found any Sicán lapidary workshops in or outside of the site of Sicán. In fact, no definite mineral bead workshops have been identified

in Peru. The two known *Spondylus* bead worshops are situated close to shell harvesting locations on the Ecuadorian central coast and Peruvian far north coast (Tumbez) (Marcos and Norton 1981; Hocquenghem and Peña 1994). Along with other materials (e.g., gold nuggets and tropical bird feathers) for sumptuary goods production at Sicán, diverse beads may have been exchanged for local agricultural produce and utilitarian items of arsenical copper bronze (Shimada 1985). Overall, limited modification of drilled beads as insets is seen as a relatively minor task conducted at ceramic and metal workshops.

The 1995 excavation of a walled-in area along the east side of the Huaca Loro North Platform (Fig. 3) yielded fragmentary gold foil, polished hammerstone, tuyeres (ceramic blowtube tips), and molds, as well as heat-discolored areas, pointing to the presence of a Middle Sicán goldsmithing workshop there, but no indications of lapidary work. We expect that workshops involved in sumptury goods production were situated near the pyramidal mounds at Sicán. Unfortunately, decades of intense looting that even employed heavy earth-moving machines has extensively disturbed the suspected areas, severely hampering our search for craft workshops. An inferred area of craft production was found in 1986 between Huaca Las Ventanas and Huaca La Botija mounds. Excavation revealed the remains of well-built room complexes with narrow benches and scorched spots on plastered floors as well as small clusters of prills (tiny metal droplets) and a few broken tuyeres.

Excavations of craft workshops at pre- and post-Middle Sicán sites offer important comparative data and insights. At the Moche V urban capital of Pampa Grande in the Lambayeque valley (e.g., Shimada 1978, 1994a) craft workshops were closely situated and accessible to each other via walled streets. In Sector H, copper working, weaving, *chicha* (fermented maize drink) and food preparation areas were found clustered and interconnected. In Sector D, an inferred ceramic workshop producing reduced ware vessels and figurines was just a few doors down from a metal workshop with chisels, discarded needles and ingot mold fragments. Both sectors were contiguous to the the political and religious seat of the Moche V polity, the centrally situated, walled compound that contained the the enormous truncated pyramid of Huaca Fortaleza. Ongoing excavations at the base of Huaca de la Luna at Moche (Moche IV contexts) also suggest a similar pattern of clustered craft activities such as pottery making and metalworking (Chapdelaine 1997).

In addition, at the Chimú capital of Chan Chan (Moche valley), Topic (1990) documented an aggregation of craft workshops and cross-craft interaction primarily in two areas called *"barrios"* (commoner residence-workshops) and "retainer areas." In the *barrios*, Topic (1990:156) observed that "Workshops were specialized spaces but did not necessarily specialize in one product." One workshop south of *Ciudadela* Laberinto (one of 11 named, gigantic, rectangular enclosures believed to have served as royal administrative, residential, and burial centers) appears to have been primarily involved in woodworking but there was also evidence of spinning, weaving, and

metalworking (Topic 1990:158). He suggests that it "specialized in inlay," and that metal and woodworkers as well as weavers "plied their trades under a common roof." Topic (1990:164) concludes that "distinct specialties" were associated within individual shops, blocks, and *barrios*. A general impression of the craft production in the retainer areas that are contiguous to the *Ciudadelas*, better built and more formally arranged, is that they were involved in finishing work by higher status craftsmen. Yet, they also revealed "the same mixture of weaving and metalworking activity" (Topic 1990:158-159). Overall, Topic (1990:164-165) and I have reached the same conclusion regarding cross-craft interaction or what he calls "horizontal integration": such organization of "specialists allows for more immediate cooperation between them to produce compound products such as the copper-inlaid carved-wood hand . . . and pieces of clothing that combine feathers, metal, and cloth. Additionally, horizontal integration allowed for direct contact between woodworkers, who probably made many weaving and spinning tools, and the weavers and spinners who used them." I concur with his assessment that "Horizontal integration is, in fact, the most logical manner of organizing craft production . . . to produce complex elite products" (Topic 1990:165). I am less certain that such organization characterized "large-scale production of utilitarian products" (Topic 1990:165). To what extent the same individuals served multiple roles as specialists of different crafts remains unclear. The intensity of production in the *barrios* and retainer areas also needs to be clarified.

Tumbaga sheet-wrapped ceramics and painted cloth with *tumbaga* sheet backing raise the important issue of the social and symbolic significance of cross-craft products. While both classes of artifacts to date have been found only in elite tombs, various lines of evidence point to their use in non-funerary contexts.

In the Huaca Loro East Tomb, the wooden shafts of scepters, a litter, and other wooden objects in elite tombs were wrapped in sheetmetal. A miniature representation of elaborate ritual activity on the back of a Middle Sicán wooden litter in the Gold of Peru Museum in Lima (Carcedo 1989) clearly includes scepters covered in gilded sheetmetal. In this sense, it would not surprise us to learn that wrapped ceramic vessels were utilized in non-funerary contexts. In general, it seems that what was critical in the wrapping of objects with gilded sheetmetal was a symbolic transformation that imparted its symbolic value to products of other media. But, were ceramic vessel forms and even ideologically charged iconography subordinate to the shiny metallic cover?

The symbolic value of gold is taken for granted in the Andes (e.g., Hosler 1994; Lechtman 1984a,b). Other project personnel and I (e.g., Cleland and Shimada 1992, 1994, in press) have argued that high-karat gold alloy objects constituted the Middle Sicán "aesthetic locus," what J. Maquet (1979) defines as a category of object or medium of artistic expression that is subject to the highest performance standards for the highest consumer expectations of

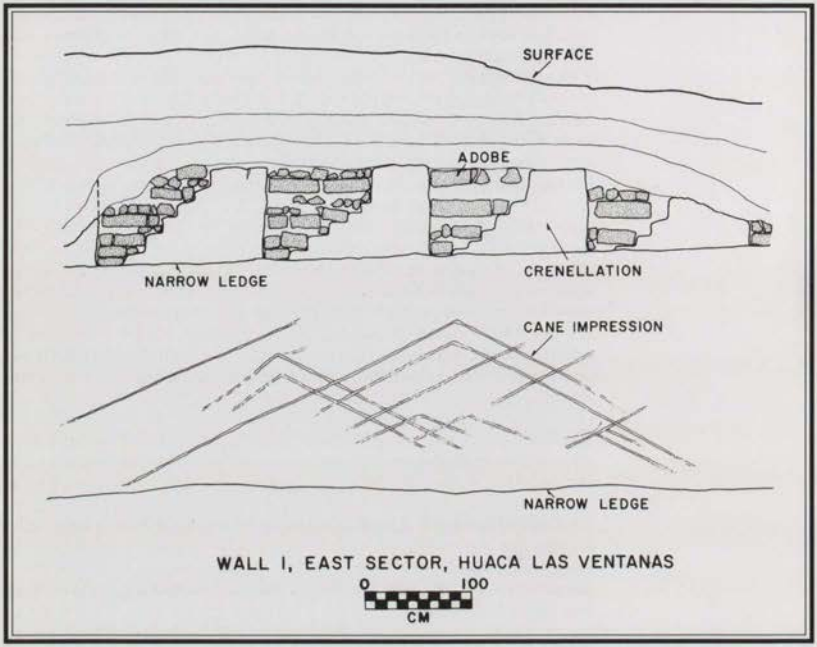


Figure 8: Cane impressions found on the face of a crenellated wall at the east base of the Huaca Las Ventanas truncated pyramid. Drawing by Izumi Shimada.

a given culture. This "aesthetic locus" often becomes the technical and stylistic "pace-setter" and may be actively emulated by other classes or media of expression or remain quite exclusive through control of raw materials, skilled artisans and/or imageries. Compare the masks that covered the faces of the principal personages of the Huaca Loro East and West tombs with that associated with a seated adult male excavated in a pit (ca. 1.5 x 0.8 m and 3 m deep) between Huaca La Botija and Huaca El Corte. The first two were of high- and low-karat gold, respectively, while the latter was a totally mineralized "copper" mask (Alva 1986). The metallic composition of this mask has not been analyzed and may well have been a copper-silver alloy. The quality of metal (i.e., proportions of precious metals) used in the excavated Sicán masks appears to vary inversely with the complexity of manufacturing technique (e.g., fashioned out of a single sheet versus multiple sheets mechanically joined together), and presence or absence as well as

quality of shell or mineral inserts, as well as stylistic and iconographic details. In fact, it appears that prestigious high-karat gold masks were emulated using less noble metals.

However, Sicán painted cloth with gilded sheetmetal backing calls into question the above vision of the primacy of gold color in the prehispanic Andean world.

As suggested for Early Horizon painted cotton cloth from Karwa on the South Coast of Peru (e.g., Burger 1992), we believe that Middle Sicán painted cloth also served as a backdrop for outdoor rituals. The discovery of impressions of a cane framework on the face of a crenellated wall that enclosed the Huaca Las Ventanas temple suggests they may have been used as replaceable wall decorations (Fig. 8). In either case, these cloths could have been placed relatively easily to create a physical setting for rituals. Imageries and overall size could be adjusted in accordance with the nature, location, and the scale of the ceremonies to be undertaken. However, given their relatively large size and complex (and even fragile) constructions, it is doubtful that they were moved frequently or over long distances.

Why do these painted cloths have sheetmetal backing? It is doubtful that it served any structural function since much of the support necessary for the display of the painted images was provided by cane and wooden poles. The thin layer of fine cotton fibers between the painted cloth and sheetmetal probably provided a flat, soft cushion on which to lay and protect the sheetmetal.

Given the corroded state of sheetmetal samples analyzed, we can only estimate their subsurface composition. Intentional or not, gilding would have made the sheet appear to be relatively rich in gold or gold and silver. But, to whom was the gilded image directed, to the participants in the rituals conducted within the space enclosed by the painted cloth, or to those outside the enclosure? Were the painted imageries more important than the color of gold or silver to the ritual participants or vice versa? Related to this, why did the Sicán people wrap ceramic vessels decorated with religious motifs? If precious metals were symbolically so important, why didn't the Sicán artisans simply create religious imageries in gold and silver alloy sheetmetal, instead of painting them? They were certainly capable of doing so and had access to sufficient supplies of such metals as attested to by the some 500 kg of scrap found in the Huaca Loro East Tomb.

In fact, the impressive range of gold-silver-copper alloys and varied degrees and kinds of surface depletion among metal objects recovered from the three excavated Middle Sicán elite tombs (including a partially used ingot found within a scrap pile of the Huaca Loro East Tomb) indicates a correspondingly wide range of golden to silvery colors and that at least a good part of the variation correlated with artifact types and their mechanical properties (Boissonnas 1997; Gordus et al. 1995; Gordus and Shimada 1994;

McLoughlin 1996; Merkel et al. 1994; Perkins 1997; Shimada and Griffin 1994). It would be difficult to determine what constituted prestigious gold color to prehispanic Andean people. We are still a long way from understanding emic perceptions of the relative importance of the multiple factors that contribute in producing given colors in precious metals.

Conclusion

In sum, this paper demonstrated the complex complementary and supplementary relationships among metallurgy and other contemporaneous crafts using Middle Sicán cases. Many of the precious metal objects were either aggregates of the products of multiple crafts or more the unique products of continuous, creative interplay among crafts. This paper also raised various specific issues that merit our attention: (1) The nature of cross-craft examples - Were they limited to luxury goods of limited production or did they include more mundane items?; (2) Organizational dimensions - How widespread was the "horizontal integration" of crafts documented on the north coast of Peru, as opposed to the discrete colonies of specialists ("vertical integration") often mentioned in the case of the Inka political economy (e.g., Brumfiel and Earle 198 ; D'Altroy and Earle 1985)? To what extent were the same individuals specialists of different crafts in making these objects? What were the physical and social arrangements of the crafts persons involved - did they ply their trade under the same roof? Did they belong to the same social groups like the historically documented *parcialidades* on the north coast of Peru?; and (3) use and "meaning" - Were these products used only in ritual contexts? Was the significance of these "composite" objects the sum of or greater than its parts?

This paper also serves as a plea for rethinking of current medium-specific conceptions of and approaches to studying craft production. There has been a welcome trend toward the integration of data and insights from excavations of production sites, replicative experiments, ethnoarchaeology, and analysis of finished products. Yet, modeling of craft production organization remains predominantly medium specific, treating each craft as autonomous and/or spatially isolated. Overall, the extent and nature of cross-craft interaction and the conditions under which it occurs deserve much more attention. As we delve ever more deeply into specialized areas of prehispanic metallurgy, it may be useful at times to take a holistic perspective and ponder the place of metallurgy within the broader spectrum of ancient arts and crafts.

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