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Los Andes: cincuenta años después (1953-2003)

Homenaje a John Murra

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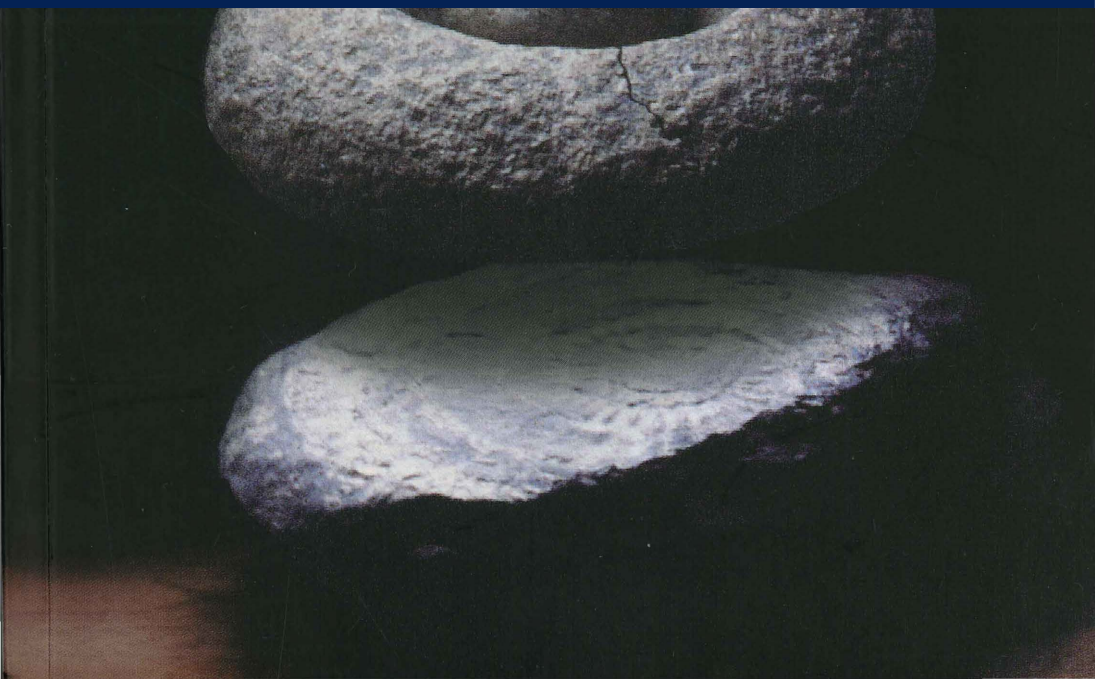

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Ethnocategories and Andean Metallurgy[1]

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In his foreword to the volume *The Social Dynamics of Technology*, Tim Ingold (1999) challenges us to specify the claims we make in using the term technology and to justify those claims. Here is my claim. Ethnocategories by which people order experience are rendered through technological behavior just as they are rendered linguistically (Lechtman 1996a, 1996b). Appropriate study of the materials technologies people used to produce objects will allow archaeologists to identify these categories and to investigate their presence and, thereby, their utility as organizing principles in other spheres of social activity.

People understand and manage the physical and social world in which they live by creating ethnocategories of things, events, behaviors, relationships that help render the world intelligible. Systems of classification are expressed linguistically, and we are comfortable in studying language to elicit ethnocategories as keys to the architecture of culture. Ethnocategories are also made behaviorally. Fortunately for archaeology, they are manifest in the materials technologies used to produce the artifacts we study. Manufacturing an object

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always involves accommodation between the properties of the material from which the object is made and the object's design: the possibilities and constraints any material presents in handling versus how we want the material to perform. The fact that the physical properties of any natural material are immutable and invariant wherever the material is found means that variations in the ways groups of culture-bound practitioners manage materials reflect cultural choices. Our ability to identify cultural decisions and choices in the technologies behind object production lies precisely in this regularity in the physics of matter (Smith 1975, Lechtman 1977, Hosler 1994).

My claim is that we may identify in materials management certain cultural principles people used to order and structure reality through technological performance, just as they organize and systematize the world through language. There is no claim that linguistic and technological ethnocategories always coincide. Sometimes they do not. But both exist, and it is up to archaeologists to identify ethnocategories that are made concrete in artifacts by virtue of the artifacts' production histories.

Ethnocategories and principles accompanying the management of metal in the central Andean area

As an example of this approach, I offer insights based on a large body of laboratory data that identify central Andean metallurgical practice in prehistory. One of the primary ways Andean objects carried and conveyed meaning was through the materials and procedures used in their manufacture (Lechtman 1977, 1984, 1993). Meaning inhered in the activity and performance of production, in process as well as in product. Cultural and material attributes were realized through and were at one with appropriate technological performance (Lechtman 1996a).

What ethnocategories and attitudes about metal as a material can we discern from Andean metal technologies?

Metal is a solid material

Andean peoples chose to focus on and to utilize those mechanical properties of metal that allow it to be shaped as a solid material: plasticity, malleability, hardening through deformation, and softening through moderate annealing. The alternative of shaping metal as a liquid material by casting it into a mould —techniques highly developed in the lost-wax castings of Colombia, Central America, and southern Mexico— was paid scant attention by Andean smiths. The distinction between these two approaches to the handling of metal is significant. The art of casting, or shaping metal as a liquid, lies in the design and preparation of the mould, not in the pouring of molten metal. The material critical to success is the refractory of which the mould is constructed. The integrity of the casting that solidifies inside is a function primarily of proper mould design. It is the mould that determines the object's shape, not the liquid metal.

Metal is a plastic material

Shaping metal as a solid relies entirely upon the mechanical properties of the metal, most particularly on its plastic behavior. Metal deforms plastically; it alters shape under the influence of an external force, such as a hammer blow and, when the force is removed, maintains the new configuration. Andean smiths were expert in the plastic deformation of the metals and alloys they produced; they concentrated on plasticity as one of metal's most valuable mechanical properties and pushed that property to its limits (Lechtman 1988). It is clear that metal in the form of sheet, hammered to uniform thickness and at times to the thinness of foil, was highly valued in and of itself (Hosler, Lechtman, and Holm 1990).

Flat, two-dimensional sheet served also and almost universally as stock from which to build three-dimensional forms. Smiths carefully hammered and pre-shaped sheet metal parts, then assembled and joined them mechanically or metallurgically to construct animal and

human figurines and other hollow, closed forms. No sculpture was too small for this sheet assembly treatment. Some of the most complex and imposing constructions we have in metal are miniatures that measure only 1-2 cm in height (Lechtman 1988).

A preponderance of Andean symbolic objects in metal appear to be of gold and silver; they are made of sheet metal. A key requirement of any sheet metal tradition is the production of sheet from material rigid enough to maintain its form. By adding copper to silver and copper to gold Andean smiths produced alloys that performed admirably. Copper as an alloying element strengthens but also toughens silver and gold. Toughness is the opposite of brittleness; a tough metal is one that resists fracture. Binary silver-copper and gold-copper (or ternary gold-copper-silver) alloys were Andean solutions to the problem of producing metals malleable enough to perform plastically when hammered into sheet and rigid enough to maintain the shape their very plasticity enabled them to achieve.

We can begin to contemplate some of the attitudes Andean smiths held about metal. First and foremost, metal was a solid whose mass could be and commonly was extended into thin, flat forms. Uniformity of thickness was achieved regularly, and thinness had value. The mechanical properties metalworkers sought and developed in alloys were plasticity, malleability, and toughness —not hardness, strength, and sharpness, those properties we associate with the development of metallurgy in the ancient Old World. Plasticity, malleabilty, and toughness are mechanical properties of natural materials. *Planarity*, a quality that describes the state of the material from which most constructs in metal were built, is a property of Andean technological style in metal and in the management of other materials, like cloth (Lechtman 1996a).

Alloys are media of transformation

Andean metallurgy was a three-component system. The elemental or material components are copper, silver, and gold. The system was

set in place as soon as these three metals were identified and used commonly, early in the Early Intermediate Period (ca. 200 B.C.- A.D. 600), and the triad remained a physical and cultural reality through the Late Horizon (ca. A.D. 1476-1532).

The most important physical property of Andean metals and alloys was their color. We recognize Andean metallic colors not primarily on the basis of linguistic evidence about color categories (Money 1998) but from consideration of the archaeological and laboratory-technical data on how metals were made and used to achieve culturally appropriate color. Metal objects, especially those made from sheet, often underwent dramatic color change during the fabrication process. Laboratory studies have shown that copper is always the medium for such color transformation (Lechtman 1973, 1984). Copper was the mother of Andean metals in the sense that it generated the properties Andean peoples sought in metal. Copper was the source of those properties, the instrument of transformation. Color was managed primarily through the development and use of two key alloy systems: the alloys of copper with silver and copper with gold, the latter commonly known as *tumbaga*. The mechanisms responsible for the dramatic color alterations these alloys undergo as they are hammered into sheet are often referred to as depletion and enrichment. The terms *depletion silvering* and *depletion gilding* describe these metallurgical color-development techniques. Copper, the necessary agent to color transformation, is always a major constituent of the alloy. The binary and ternary *tumbaga* alloys enabled objects to present culturally required metals and colors —varied hues of copper, silver, and gold— produced through transformations within the structure of the alloys themselves. Thus color, the emblem of the object, comes from inside it. In the Andes, color was the external and enhanced consequence of a change in internal state or structural order (Lechtman 1996a).

Precise knowledge and its cultural organization

We have identified two components of a central Andean technological style to which metalworkers were committed in prehistory. The features of one component include planarity (two dimensionality) and joining of pliable parts. The other component is characterized by development of a layered structure within the material itself and the realization of surface color through the manipulation of such structural layers. Both components were achieved through management of the metal copper.

There are some clear levels of correspondence between the handling of metal and the management of cotton and camelid fibers in the Andean zone (Lechtman 1988, 1993, 1996a). Both resulted in the manufacture of essentially planar expanses of pliable material: metal sheet and woven web. These then served as the basic products for the elaboration of other objects, such as metal sculpture and cloth garments. If, however, we consider *dimensionality* rather than form as the focus of Andean manufactures in cloth and in metal, we note that the three dimensions of a woven web or a metal sheet are given by its two areal dimensions and by a third vector that defines what lies inside or beneath. This third dimension corresponds to the essence of the material or the object and is structure dependent. In structural weaving, for example, designs and color areas, all the message-bearing features of the cloth, are generated by the manipulation of planes of warp and weft yarns, the structural building blocks of the woven web (Lechtman 1984, 1993, 1996a). The meaning of woven cloth in the Andes is synonymous with its rendering; structure and essence are one (Conklin 1996).

The same argument holds for the depletion and enrichment phenomena that develop culturally appropriate colors at the surface of metal objects. In analogy with woven materials, the internal structure of many worked, *tumbaga*-type alloys consists of intermeshed layers of metallic phases. The manipulation of this microstructutre is what generates and releases the color.

If our aim is to identify certain aspects of the culture of a prehistoric people from their technological experience, then we need to ask the question: do these features of Andean technological behavior —ethnocategories technologically rendered— reflect or embody, or did they even help generate, a conceptual system more broadly held by Andean peoples? Ethnohistorians and ethnographers of present-day Andean communities discuss long-held Andean beliefs in the presence of a life force or «animating essence» (Allen 1988; Carpenter 1992) in all things, including manufactured objects (Taylor 1974-76; Harrison 1982). The ethnographies also describe an Andean cosmic vision of a circulatory world (Urton 1981; Allen 1988) in which spatial and temporal components are inseparable. That world has a «subterranean interior that contains both past and future» (Allen 1988: 226); the interior world incorporates events that have already occurred and that may reoccur, to emerge outside. These events, like the setting and the rising sun or the flow of celestial and terrestrial waters, pass through a plane that separates celestial space from the underworld, in a circulatory round. The earth is this plane, a mirror that alternately reflects celestial and subterranean order across and through itself (Urton 1981).

The technological ethnocategories considered in this discussion of Andean metal artifacts —solidness, plasticity, planarity, transformation— join space, or the material aspect of the world, with time, both history and the future, in that, as a system, they differentiate essences from interior states or conditions. The development of the essential qualities manifested by cloth or metal are historical processes; the end result comes from altering a previous condition and transforming it in present time. This set of ethnocategories is observable in the archaeological record as features of what people decided to do as they managed aspects of their material world. We identify them because they remain as physical facts of technological behavior. What they show is that the relations between technological performance and the shared cultural expectations that

render the world intelligible to Andean peoples seem close (Lechtman 1996a).

Ethnocategories linguistically and technologically rendered

The highland mining district of Julcani, in Peru's Department of Huancavelica, draws miners largely from communities in Angaraes Province, where the mine is located. They work a polymetallic silver-lead-zinc deposit, though enargite (copper sulfarsenide) ores are also present. The miners share a set of beliefs about the underground world from which they extract metallic ores and about the relationships of the ores to that world and to one another (Salazar-Soler 1992). These beliefs integrate ideas with strong roots in the preHispanic past and others introduced by Europeans in the sixteenth and seventeenth centuries.

Ethnohistoric accounts describe certain attitudes and practices surrounding mines and the mining of metallic ores that were current among Andean communities during the Inka hegemony (Berthelot 1978). Miners selected, safeguarded, and venerated certain exceptional ore specimens they extracted from individual mines. These metallic minerals they called *mamas*. *Mamas* were distinguished by some special quality or suite of qualities: richness of the metal content of the ore, extraordinary size, vivid color, unusual shape, rare beauty. *Mamas* were *huacas*, sacred stones; each mine had its own *huaca*, regardless of the kind of metallic ore it represented: gold, silver, copper, mercury.

In a more general sense, we learn from early Spanish accounts that Andean peoples considered metallic minerals as products of the earth, just as plants are such products. Metallic minerals, like plants, were believed to be born and to grow inside the earth, from which they are harvested (mined). The first and largest fruits of unsown plants were selected each year and designated *mamas*, which suggests that they, along with unique metallic mineral specimens, were

identified and named according to a fundamental Andean system of organization (Berthelot 1978; Salazar-Soler 1992).

In their myths and in ritual practice, Julcani miners today preserve the continuity of these traditions. A myth that recounts the origin of metals describes their birth in the order: gold, silver, copper, lead. Of all the metallic minerals, Julcani miners believe, only gold has completed its cycle of growth and maturation inside the earth; thus gold is the sole metal, the *mama*, to have been born. The other metals —silver, copper, lead, mercury— are incomplete, considered by the miners as fetuses or still born (Salazar-Soler 1992).

Gary Urton (1997) comments that the classification of metals, by these contemporary miners and by Andean peoples in prehistory, follows a fundamental paradigm that operates in the Quechua language. Urton shows that non-numeral, ordinal-like sequences —such as the fingers of a hand, the tines on a pitchfork, the vertical position of a sequence of ears of corn on a stalk, the interrelated groups of *ayllus* (kin groups) occupying a given territory, the colors of the rainbow— are conceptualized in Quechua in terms of reproductive processes and kinship relations. « ...[O]rdination is constructed as a set of relationships having as its prototype a 'natural' set of four or five members beginning in a principle associated with *mama*, the mature, reproductive female, and ending in an immature, essentially nongendered member of a consanguineal group, the child» (Urton 1997: 87). Urton argues that the role of *mama* as «progenitrix» in Quechua systems of classification operates for metals as for other sets that order members through states or stages of reproduction. Metals grow inside the earth from a common *mama*, gold; silver, copper, lead, mercury follow as less developed, «weaker» members of the line.

This metal set is unlike the other ordinal-like sequences Urton uses as examples of Quechua classification schemes, however, for in all of those, some physical relationship associates the members: fingers to hand, tines to pitchfork, color bands to rainbow, corn cobs to

corn stalk, *ayllus* to common territory. The link between *mama* and offspring is readily apparent. The metal sequence is founded on no such physical associations. The physical features that assemble metallic minerals in a natural group are their location within the earth, and the need for people to intervene and to excavate them from a subterranean environment in order to process them for their metallic content. A mine exists only when miners elect to exploit an ore; under such circumstances, all metallic ores are physically associated with mines. But the ores are not necessarily associated with one another —as are fingers or tines. In a polymetallic deposit, certain ores such as those of silver, lead, and zinc, may be present in zoned association. But others in the classificatory set will not be present. Some deposits are rich in a single mineral species, yielding none of the other members of the set. Finally, metallic ores of one species do not alter to ores of another. There are no physical or chemical processes by which such transmutation occurs. It may be that in the case of metals, the analogy with plants that grow and mature, producing ripe fruit, encouraged the grouping of metallic minerals in a sequence of members with a head: a *mama*. But the order among members likely represents cultural hierarchies established for them early in Andean prehistory and preempted by the Inka. That order reflects social status, religious, and gender ascriptions that governed how and by whom these metals were used (Alva and Donnan 1993; Lechtman 1997).

The utility of a materials-archaeological approach in this instance, of focusing on what and how people do rather than on what and how they say, is that it confines us to scrutiny of metals and their relationships in practice. Ethnocategories arise from patterns of technological practice, whether or not those patterns are labeled linguistically. My estimation that copper was the mother of metals among Andean smiths comes from the facts of how copper was managed in association with other metals. It does not assign to copper the role of *mama*, or any other role for that matter. Role assignment is a cultural

function. It simply reports kinship between copper and other metals when they are alloyed together. In Andean metallurgy, copper was the metal whose presence enabled previous properties to be altered and new ones to be generated.

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