

COLONIALISM, COLLECTIVE ACTION, AND THE ANALYSIS OF
TECHNOLOGICAL STYLE

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ABSTRACT

This paper recognizes two problems in recent studies involving technological analyses and contact period archaeology. In colonial studies, the application of the concept of technological style typical in prehistoric research contexts (i.e., as an expression of cultural identity) becomes problematic due to the shifting assignations and appropriations of class, ethnic, and racial identities within colonial social structures. In such research contexts an ambiguity of interpretation often emerges between whether an observed technological style is reflective of degrees of cultural continuity, or a practitioner's agency in confronting colonial regimens of practice. Secondly, discussion of such practices as modes of acculturation, creolization, or hybridization unnecessarily categorize social relationships embedded in technological practice in terms of a post-colonial discourse rooted in nationalist politics from which these terms emerged. This paper argues that instead of applying the observation of technological style to interpretations based on categories of identity, it may be more informative for the understanding of the social dynamics and politics of resistance within colonial interactions to situate such observations in terms of how they reflect mobilizations of collective action.

The paper explores the intersection of colonial mission and mining interests and Puebloan mineral use in the early colonial period of New Mexico. Archaeological and archaeometric data from the excavation of the early 17th century metallurgy facility within the Pueblo of Paa-ko (LA 162) are combined with ethnohistoric data on the organization of labor in both colonial work environments and in the production and exchange of materials involved with Puebloan ritual paraphernalia to argue that resulting 'syncretic' technologies reflect competing mobilizations of collective action that offer loci for resistance by resonating with pre-colonial material practices.

INTRODUCTION

Bridging the gap between prehistoric and historic archaeology involves not only a rapprochement of data sets but also a reassessment of common theoretical constructs applied to each research context (Lightfoot 1995). Having spent most of my graduate career ‘tacking’ back and forth between pre-historic and historic projects in the United States, and in the process of grant submissions and re-submissions, I have come to realize how difficult it is to transfer certain concepts between prehistoric and historic archaeology, particularly when one’s proposals are reviewed by scholars with experience in only one of these fields. In this paper I would like to critically review two concepts, widely used in prehistoric archaeology, that I have found useful in my past research on early colonial encounters but regard as problematic in this context.

My first critique involves the application of the concept of technological style as developed by researchers tracing their intellectual history from Heather Lechtman’s work on Andean metallurgy (Lechtman 1977). This approach is most often applied to prehistoric, or pre-colonial, technologies, and has allowed for nuanced interpretations of the culturally specific ways in which technologies develop, yet few studies bridge the gap between pre-colonial and colonial practices. Due to a focus on cultural-specific structures, the analysis of syncretic aspects of technology, material forms viewed as a synthesis of cultural influences typical of early colonial contexts, often remains unaddressed.

My second critique is of the concept, within historical archaeology, of “cultural hybridity,” a second problematic aspect of research concerning early colonial assemblages. Early colonial material culture studies that recognize syncretic practices have tended to create narratives that substitute older acculturation models based on a duality (dominant vs. passive cultures) with various ‘mixings’ or ‘hybridity.’ These concepts tend to flatten historically situated social relationships by suggesting a pattern of interaction based on ethnically-static entities. This paper takes a different approach and seeks to view apparent syncretic technologies as representative of conflicting meanings, meanings that were perhaps transitively applied. Rather than representing a static cultural ethos I argue that such meanings reflect the relationships of artisans in networks of collective action.

A STRUCTURALIST DILEMMA: TECHNOLOGICAL STYLES IN THE COLONIAL PERIOD

Stylistic analyses in archaeology have advanced the practice of technological analysis through a re-incorporation of a concern for meaning in the creation of material culture. The ‘technological style’ approach was first defined by Heather Lechtman, but has

roots in the pivotal work of Cyril Stanley Smith, a metallurgist by training, who sought to combine a detailed understanding of the material properties of artifacts with an intuitive sense of the aesthetic experience of their making (Lechtman 1977; Smith 1981). The 'technological style' approach has been effective in exposing underlying structural properties of technologies that are culturally-specific. This approach recognizes that the cultural meaning and use of artifacts are bound to the ways in which material properties and production processes are structured. Two of the primary practitioners of this approach, Heather Lechtman and Dorothy Hosler, have systematically identified what could be termed 'material metaphors' that structure creative action in the technologies they investigate (Hosler 1994; Lechtman 1977: 1984). Hosler's analysis of the metallurgy of pre-colonial West Mexico identifies symbolic associations of color and sound as major structuring elements in the production of a range of metallic artifact types creating what she identified as "a sacred domain of experience" (Hosler 1994: 227). Similarly, Lechtman's analysis of metallurgical surface enrichment techniques in the Andes suggested a link between weaving technologies and metallurgy through the employment of a concept linking visual appearance to structural composition that reflected basic Mochica concepts concerning the unity of appearance and character (Lechtman 1984).

This approach is informative for pre-colonial contexts because of its ability to link technological choices with cultural meaning. Yet few studies of colonial period technology exist that adopt this approach effectively, and many of the studies of pre-colonial technology in the Americas fail to address changes in indigenous practices in as detailed a manner when dealing, however briefly, with the colonial period. I feel that this has to do with the structural fixity of meaning placed upon material objects in such studies. If the meaning of an object becomes fixed due to an observed cultural ethos, how does one account for technologies that cross perceived cultural boundaries? It seems that if one fixes meaning on the object too rigidly, the only model of technological change available through the colonial period is one where indigenous structures of meaning are obliterated. Lechtman's otherwise excellent stylistic analyses of pre-colonial metallurgy seem to be trapped in this dilemma, unable to extend such analyses beyond the divide between the prehistoric and historic periods. This is evident in comments regarding Andean metallurgy as "...on the threshold of assuming a much more important role in Andean life when Andean civilization was cut down by Spanish invaders in search of the rich gold and silver deposits of the land" (Lechtman 1984: 36). Yet historical documents indicate that the Spanish mining and metal industry was reliant upon indigenous skill and labor (Barrett 1987; West 1949; 1994). If practice is recursively linked to the production and re-production of cultural structures then at

which point is an industry homogenized as ‘colonial’ losing its pre-colonial meanings? If the same social groups are making the same materials, how and/or why, has the significance of them changed?

The persistent involvement of indigenous communities in colonial production suggests that the meanings given to objects and materials from such practices are historically contingent. To develop an understanding of colonial period technologies we need to look past the apparent truncation of an applied cultural ethos with the imposition of colonial production regimes, and begin to look at the specific choices that practitioners make in relation to colonial structures of power. Kathleen Ehrhardt has addressed some of these questions by combining a stylistic approach to technology with a concern for situating technology within a larger context of practice that she terms the “technological system,” as defined by David Kingery (Ehrhardt 2005; Kingery 1993). Her research on the incorporation of European copper metals into Illinois metal-working technology emphasizes the dynamic nature of technological practice. Ehrhardt recognized that when Illinois incorporated European goods into their systems of representation, such systems were not truncated by colonial practices or material meanings. Rather, practitioners’ creative responses to the new materials and networks of distribution made them meaningful in their own terms. Ehrhardt’s approach departs from traditional analyses focused on the definition of cultural norms to a concern for the agency of practitioners. Ehrhardt adopts “a view of technology in which all technological activity is viewed as potentially innovative, creative, and imbued with multiple levels of social and ideological significance which can be revealed through detailed, fine-grained, finely textured analysis” (Ehrhardt 2005: 197). Sensitivity to the potential multiplicity of meanings layered within technological action is key to developing an approach that can begin to address the social construction of technological syncretism during the early colonial period.

Concepts such as Kingery’s notion of the technological system, Leroi-Gourhan’s concept of the *chaîne opératoire* (Lemmonier 1993), and Schiffer’s system of ‘behavioral chain analysis’ (Schiffer 1992), all stress the interconnectivity of technological practice. I refer the reader to Dobres (2000) for a more thorough review of this literature. Through the interconnectivity of technological practice, the agency of practitioners can establish social and material links between: 1) themselves and the landscape of procurement and associated concepts of ‘place;’ 2) related technological practices linked to the production process and their associated values and meanings; and 3) between other practitioners in diverse fields of practice. Viewed in this light, technological practice can be perceived as a form of *collective action*, and has the

potential to express the agency of communities of practice, communities that may or may not be defined by a specific spatial locus or defined cultural ethos.

BETWEEN DYNAMISM AND STASIS: THE PARADOX OF CULTURAL HYBRIDITY

Concepts of cultural hybridity, such as the recognition of processes of *mestizaje* or *creolization* have been useful in critiquing the concept of acculturation which dominated the literature on the early colonial period during the structural-functionalist period of American Anthropology (Cusick 1998; Deagan 1983; 1998). Their primary value can be said to rest in the recognition of agency on the part of colonized and subjugated individuals in the formation of the multi-ethnic communities typical of the early colonial period. Yet, as with the tacit assignation of observed technological style to a fixed meaning related to a ‘cultural ethos,’ cultural hybridity concepts similarly and unnecessarily categorize technical choices into categories of identification that may not be the most relevant for understanding the historical contexts in question.

I recognize two potential problems with the unqualified use of terms of cultural hybridity in early colonial studies, following critiques of the concept developed by Alonso (2004) and Dean and Leibsohn (2003). First, terms of hybridity prioritize a concept of ethnic identity as the main shaping factor in syncretic material culture, therefore disregarding other factors of personal and social history, and, by doing so, un-necessarily group diverse social and historical factors into a category of meaning based on current political discourse. Dean and Leibsohn argue that current conceptualizations of culture generally recognize its unbounded and dynamic nature due to the recursive borrowing and reformulating of ideological, material and social elements by agents in the formulation of social forms. Yet, when such mixings are viewed in a colonial context, they appear to take on an added significance. The recognition of hybridity in such contexts, they argue, is a product of a history of discourse concerning the homogenization of difference into opposing entities:

The descriptive term “hybrid” therefore performs a double move: it homogenizes things European and sets them in opposition to similarly homogenized non-European conventions. In short, hybridity is not so much the natural by-product of an “us” meeting a “them”, but rather the recognition—or creation—of an “us” and a “them.” (Dean and Leibsohn 2003: 6)

The formulation of hybridity as a concept is intimately tied to colonial discourses on the nature of ethnic difference. These set conceptualizations of cultural purity regarding European culture against a similarly applied notion of purity applied to pre-colonial

indigenous cultures. Integral to the formation of colonial social hierarchies, these discourses contributed to creating categories of identity based on degrees of mixing. Use of hybridity concepts are problematic because they are rooted in a taken-for-granted duality and thus tend to create narratives linking the agency of individuals to an unspoken struggle between opposed and homogenized ethnic identities.

This observation ties into the second part of the critique, namely that such terms are part of a post-colonial discourse involved with the attempt at fabricating a homogeneous national identity and retain the ‘taste’ of such nationalist meanings despite their use in resistance ideologies. As Alonso notes, particularly in the case of concepts of *mestizaje* in modern representations of Mexican history, hybridity is often used to promote a post-colonial national identity based on the equitable mixing of indigenous and European people and culture. This both masks the historical realities of subjugation and disenfranchisement experienced by various indigenous groups through the development of the modern nation state, and creates a further distinction between a perceived modern identity of hybridity versus a view of indigenous peoples as static and backward (Alonso 2004: 460).

The use of terms of hybridity, seen in this light, seems diametrically opposed to current archaeological research that is conceptualized as practice (*sensu* Bourdieu). Despite the apparent dynamism, a conceptual undercurrent of a normative and static culture concept is present in such terms. As in the case of applications of notions of technological style, rather than look at static cultural entities, it is perhaps more informative to look toward what Pfaffenberger has called the “meanings” of technological choices when attempting to understand the processes by which syncretic technologies are formulated. As he argues concerning the adoption of western technologies in post-colonial contexts:

This focus allows for a much more fine-grained analysis than one which assumes a cultural “variable” that is generally diffused throughout a culture, and for one very simple reason: meanings can vary without losing their *potency*. If we must assume that a “social ethos” is powerful only if it is held by *all* members of a culture, then it will be very difficult indeed to find any social ethos which is powerful enough to override all other considerations. If we assume that people act according to the *meanings* they ascribe to situations, however, and that these meanings vary from group to group *within* a culture, we can speak of a *variety* of behavioral responses to a situation, *all* of which are engendered by meanings, and *all* of which can potentially override other considerations—even though they contradict one another. To

take such a view is to see patterns of human action as a *discourse*, a cultural framework in which a *variety* of behavioral strategies are constructed from the ideological *bricolage* of a historical moment (Pfaffenberger 1993: 344).

Pfaffenberger, like Ehrhardt, recognizes that meanings and values constituent to a technology are dynamic, situational and related to a particular historical context. This dynamism can be one of contradiction and conflict as well as one of negotiated synthesis. Technological syncretism may be less associated with a mixing of practices, as it reflects a transient layering of relationships. This theme will be explored below in regards to the development of the early Spanish colonial mining industry in New Mexico and its intersection with Puebloan technologies of mineral procurement, processing and use.

THE SPANISH COLONIAL MINING INDUSTRY IN NEW MEXICO, 1540–1700

The establishment of the colony of New Mexico in 1598 was directly related to the expansion of the Spanish colonial silver-mining frontier. Many of the early attempts at colonization were motivated by the search for mineral wealth (Jones 1988). The technology and scale of early colonial mining and metallurgy in New Mexico are not well understood, though recent work conducted at the Pueblo of San Marcos and in the Cerrillos mining district is beginning to remedy this situation (Ramenofsky and Vaughan 2003; Vaughan 2001). The practice of metallurgy was introduced by the Spanish in the regions that are now the southwestern United States, and hence the context for technology transfer differs from those explored by Ehrhardt or those that existed in Mexico at the time of conquest, where traditions of metallurgy had a considerable time-depth (Ehrhardt 2005; Vargas 1995).

Of equal importance to the investigation of the processes by which metallurgy became adopted by indigenous groups in the southwest, is the investigation of the processes by which Spanish colonial technology became established in the remote region of New Mexico. The establishment of the mining industry in New Spain is not a self-evident process. Despite the unbelievable wealth of mineral deposits present in places like Zacatecas and Parral, the effective exploitation of those resources depended upon both the intricate mobilizations of capital, labor and the interrelationship of ancillary industries with the equally intricate social and legal systems of the Spanish colonial world (Couturier 2003; Sheridan 1992; Stein and Stein 2000). Historical and material records of the mining industry attest to the great effort expended on the transformation of European technology to meet the requirements of both the dry and

woodless environments of northern New Spain, and to the challenging peculiarities of the ore sources encountered there.

The viability of the mining industry was dependent upon the incorporation of indigenous practices and labor in both the formation of the technology and the practice of mining and smelting (Flores 1994; West 1949). The profitability of colonial silver mining depended upon the availability of indigenous labor, which was made possible through systems of tribute appropriated by colonial elites from pre-colonial state systems (Stein and Stein 2000). In some instances, ownership of mines and smelting facilities were retained by indigenous communities in Central Mexico into the 17th century, a century after conquest, suggesting that traditional skill developed by these communities played as much a part in the initial mining industry as the appropriation of labor (Barrett 1987).

Based on the historical development of the mining industry in New Spain in general, incorporation of Native American labor and skill must have been of key importance for the development of mining and metallurgy in New Mexico. The way that explorers and colonial officials attempted to assess the worth of potential mining regions within New Mexico sheds light on this dynamic. From the documentation of the Coronado Expedition in the 1540's through to the re-conquest of New Mexico by Diego de Vargas in 1692, the perceived intersection of mineral resources, compliant Native American communities, and abundant wood and water resources, provided both a template and a motivation for continued attempts at the establishment of the industry and the colony.

HISTORICAL RECORD OF MINERAL EXPLORATION

Richard and Shirley Cushing Flint's recent re-translation of the documents pertaining to the Coronado expedition stresses the importance of indigenous labor to colonization, recognizing that:

...the Coronado expedition and scores of others like it that took place during the 1500s were not primarily exploring parties bent on simply charting the unknown. Empty land was of little interest to them, regardless of its mineral or agricultural potential. Instead, they sought out people—specifically, people who possessed or produced high-value goods that might be appropriated by means of a kind of taxation (Flint and Flint 2005: 381).

This search for an integrated landscape of producers, goods and products placed a priority on the value of Native American labor. This is succinctly stated by Castañeda

de Nájera, one of the members of the Coronado expedition, in his assessment of the expedition as a failure:

I state that in a space of seventy leagues across that settled land and of a hundred and thirty leagues lengthwise along the Rio de Tiguex, no more peoples or settlements were seen or found than those already related. There are repartimientos in Nueva España with a greater number of people, and not just one but many. In many of those pueblos along the Rio de Tiguex there was a silvery metal, which they had in order to glaze pottery and paint their faces (Flint and Flint 2005: 422).

In this statement Castañeda de Nájera links mineral resources with the poverty of settlement along the Rio Grande in comparison to the densely populated areas of central Mexico. Rather than an indication of wealth, in relation to the economic dynamics of 16th century *encomienda* claims, this passage seems to suggest the improbability of an *encomienda*-based mining industry.

By the last decades of the 16th century, the nature of the mining industry in New Spain had changed. The mercury amalgam method of smelting silver ores was replacing the earlier technologies of smelting ores and extraction of precious metals with lead (West 1994). The abundant silver mines of Zacatecas (discovered in 1546), Guanajuato (1557) and Santa Barbara (1567) had pushed the mining frontier beyond central and west Mexico into the arid regions of northern New Spain (Sanchez-Crispin 1994). These mines had grown into large multi-ethnic settlements drawing resources from a wide area. This change in the nature of the mining industry is reflected in the renewal of claims of mineral wealth in New Mexico and the expeditions that followed.

The Espejo expedition of 1582, sent to New Mexico to recover two Franciscan Priests who went to evangelize the southern Tiwa as part of an earlier Chamuscado expedition, provided some of the first fairly detailed assessment of mineral resources in the region. Diego Pérez de Luján, the chronicler of the expedition, based on the way in which he approached the description of resources, must have held both a working knowledge of the mining industry and a familiarity with mineral deposits. Throughout his account he weighs the availability and quality of potential ores with the proximity and availability of labor and wood resources. This is evident in his association of potential mineral wealth with his assessment of the population around Zuni:

Having received news of mines, God willing, we are going to discover them. I shall give an account of whatever takes place. At present I merely wish to say that if there are good mines this will be the best

land ever discovered, because the people of these provinces are industrious and peaceful (Hammond and Rey 1966: 184).

From Hopi, the expedition was led to mines west of the mesas. These were sources for the blue-green pigments noticed at Zuni and Hopi, yet upon being assayed they were shown to have no silver content and interest in the area waned. In his account, the recognition of a possible labor source that is both “industrious and peaceful” is given as much weight as the potential discovery of ore sources.

After the establishment of the colony in 1598, expeditions were sent out to areas reported to have mineral resources. The area visited by Luján was re-examined by an expedition led by Marcos Farfan de los Godos, the captain of the guard of the colony. Again proceeding from Zuni to Hopi, the expedition headed west, over the Little Colorado and past the San Francisco peaks, into what later became the copper mining district of northern Arizona in the American period. Relying upon Hopi guides, the expedition encountered *rancherías* within the mountains of non-Pueblo people, who were apparently processing minerals for pigments. After establishing contacts with leaders within each group, Farfan proceeded from settlement to settlement, being presented with “powdered ores of different colors” along with other gifts of food and animal hides. They were subsequently led to a mine “from which the Indians extracted the ores for their personal adornment and for the coloring of their blankets, because in this mine there are brown, black, water colored, blue and green ores (Bolton 1963: 224).”

Both the Farfan and the Luján documents are striking in their repeated reliance upon Native American informants for the location and assessed value of minerals. This begs the question: how, particularly in the early contact period, was this value established? How were Pueblo concepts of mineral qualities and values interpreted/translated into Spanish held values of mineral wealth and vice versa? It is apparent from both the route of exploration, and explicitly in the Farfan document, that ore bodies were being found based on the mineral procurement and processing techniques of Pueblo pigment technologies.

ETHNOGRAPHIC AND ARCHAEOLOGICAL DATA ON MINERAL USE

Moving between historical documents related to mineral prospecting by members of the *entradas* into New Mexico, ethnographic accounts of mineral use and significance by Pueblo artisans from the end of the 19th and early 20th centuries, and archaeological data for the use of minerals (particularly in the production of painted and glazed ceramic traditions), places the intersection of Spanish mining interests and Puebloan pigment processing into a larger social and technological context. The historical

documents cited above suggest that the early colonial mining and metallurgical industry in New Mexico was a result of the intersection of these two technological traditions. Approaching the intersection of Pueblo and Spanish mineral interests from a stylistic analysis suggests two research questions. To what degree were Pueblo individuals responsible for mineral procurement and processing in the new industry? How were the meanings ascribed to each technology negotiated or contested under the new colonial system?

One way to approach this issue is to refer to the ethnographic data gathered on mineral procurement from ethnographies of the late 19th and early 20th centuries. Elsie Clews Parsons, Ruth Bunzel, and Frank Hamilton Cushing all gathered data on mineral procurement and use, in part because of its close association with Pueblo ritual and the creation of Katchina masks. Due to the spiritual significance of pigments, mineral procurement and processing was found to be under the proprietary rights of Kiva societies. Parsons notes that mineral processing was conducted in a similar manner as parties conducted for the grinding of prayer-meal. Minerals that Parsons documents include the use of kaolin clay for a white pigment, copper ores such as malachite and azurite for a blue green color, hematite for red and pink colors, pyrolusite for black, and yellow hematite for yellow (Parsons 1966: 352-353). In addition to Parsons' account, Cushing notes the use of both a lead and zinc rich mineral and specular hematite as a shiny black pigment (Cushing 1979: 92). Minerals collected from certain regions retained their geological association with the landscape, both Parsons and Cushing documented that color was also a symbolically imbued attribute of place, linked to aspects of the four directions. The importance of pigment was stressed by Parsons in her claim that "the pigments are what make the mask sacred" citing Bunzel's remark that it also made them "valuable" (Bunzel 1929; Parsons 1966: 341).

These associations of meaning for pigment use are also indicated archaeologically, particularly in the development of glaze paint technology. Recent research on the ceramic technology of the proto-historic period in the Southwest has indicated that mineral use played a significant role in the expression of aspects of social identity on many levels. The use of glaze and paint design and mineral inclusions as temper may have played a role in establishing both inter- and intra-community identity, regional identity and religious ideology (Adams 1991; Crown 1994; Duff 2002; Graves and Eckert 1998; Habicht-Mauche 1993; Mills 2002). Glaze ware in particular played at least a materially significant role in the establishment of community identity in both the Eastern and Western Pueblo areas. The development of glaze ware styles in relation to wares derived from Mesa Verdean traditions appear to mark distinct regional associations to place and ideology. Habicht-Mauche, in her stylistic

analysis of Pueblo IV ceramics has argued that this trend can be conceptualized as a “localization” of production, begun in the thirteenth century, coupled with a “commodification” of crafts and raw materials that produced a shift away from an emphasis on local production and consumption, to local production for trade (Habicht-Mauche 1993: 96).

The commodification of crafts and raw materials appears to be linked to the increasing importance of the Katchina religion and the Southwest Regional Cult (Crown 1994). Snow suggests that the trend towards community specialization is driven by the need to obtain materials for ritual paraphernalia (Snow 1981). Following Adams (1991), many researchers have interpreted this phenomenon as related to the functioning of the Katchina religion, linking communities at a regional level. Similarly, through an analysis of decorative elements, Graves and Eckert argue that distinctions between glaze ware ceramics and the black-on-white traditions of the Biscuit Wares and Jemez Black-on-white reflect regional variations in belief systems (Graves and Eckert 1998). Rio Grande Glaze Ware, in their analysis, reflects a more Western Pueblo-derived ideology related to the spread of the Southwest Regional Cult.

Mineral procurement and processing for ceramic production can be viewed as intimately related to the creation of both community and regional ritual associations to place. Andrew Duff’s (2002) analysis of the production and consumption of wares in the Little Colorado region, in close proximity to the area explored by both Luján and Farfan, suggests that migrant households in the Pueblo IV period maintained historical associations to place through the crafting of specific wares. Duff presents a pattern of ceramic distribution which suggests that production and exchange of ceramics linked migrant households to the establishment of regional ideological associations. Such associations are ultimately related to the locations of mineral resources within the landscape and created metaphorical associations establishing the meaning of place through the practice of mineral procurement technologies.

TECHNOLOGICAL SYNCRETISM: LATE GLAZE CERAMICS AND THE EARLY COLONIAL MINING INDUSTRY

At the time of colonization, Pueblo IV lead- and copper-glazed wares were no longer being produced by the Western Pueblos. The Spanish mining industry apparently followed the trail of former mineral procurement for lead glaze to the east in finding ore bodies to exploit. Mining and smelting operations were established in proximity to the source of the minerals used for the Eastern Pueblo glaze ware traditions in the Galisteo basin, adjacent to the Cerrillos Hills source for lead and silver ores, and in the San Pedro Valley, adjacent to the copper and lead ores of the Sandia and San Pedro

Mountains. After the establishment of the colony, glaze ware reappeared in the Zuni area with the manufacture of Hawikuh Black-on-red and Polychrome types. This ware is similar to Eastern Pueblo glaze ware ceramics suggesting a re-introduction of the tradition into the area from the center of Spanish mining interests. This reintroduction of glaze ware can be viewed in some ways as a technological syncretism both in the fact that its re-introduction was through colonial networks, and in its elements of visual design. Hawikuh glaze ware is distinctive in its incorporation of Roman cross motifs as well as eagle feather motifs associated with warfare. Katchina imagery typical of the proto-historic period also becomes both less prevalent and less visible on the ceramic design field perhaps in response to Franciscan attempts at suppression of ritual practice (Mills 2002). Similar changes occur on Eastern Pueblo ceramics as well, particularly in the increased obliteration of design elements through the use of copious amounts of runny glaze and through similar shifts in the placement of religious imagery to a more hidden location in the design field.

The establishment of the Spanish mining industry at the source of minerals needed for glaze manufacture suggest a link to these trends in ceramic production. Three archaeological sites within this area containing evidence for the continuity of proto-historic Puebloan mineral procurement and processing strategies appropriated by Spanish mining practices have recently been excavated: the Bethsheba Mine, San Marcos Pueblo, and Paa-ko (Bice et al 2003; Lycett 1997; 2001; 2004; Thomas 2002; Vaughan 2001). The Cerrillos Hills sources, including the Bethsheba Mine, have been recognized as the primary sources for lead material forming the basis of glaze paint recipes in both the pre-colonial and early colonial periods (Habicht-Mauche et al 2000). Excavation and survey of the Bethsheba mine has indicated a continuity of workings, where Spanish influenced mining proceeded from the exposure of ores created by pre-colonial Puebloan mining practices (Bice et al 2003). San Marcos Pueblo, the closest pueblo to the Cerrillos Hills, most likely played a large role in the distribution of this material in both periods and during the colonial period became one of the major Spanish mission sites in the Galisteo basin. The San Pedro Valley, where Paa-ko is located, though known to contain lead ores, contains pre-colonial mines for the extraction of copper minerals that date back to the 14th century (Cordell 1980). Both San Marcos and Paa-ko fit well within the criteria for the establishment of a mining district on the Spanish model, in that both are settled agricultural communities adjacent to ore, wood and water resources.

The historical component of Paa-ko was inhabited from the middle of the 16th century, before colonial occupation, and through the middle of the 17th century, possibly the 1670's, at which point it was abandoned for residential purposes. Over the

last ten seasons, research conducted by the University of Chicago Field Studies Program has documented changes in plaza maintenance and use, patterns of change and continuity in open air work areas and corral systems linked to the incorporation of domestic animals into the pueblo's economy, the establishment of a small church superimposed on one of two historic period Kivas, and the development of a metallurgical workshop adjacent to the historic plaza. The workshop, dated to the first half of the 17th century, is over 136 m² in area and appears to have been re-built, or re-modeled, at least seven times. My own research involving the metallographic and petrographic analysis of raw materials, products and byproducts of the manufacturing processes present at the site indicate a wide range of metallurgical techniques including the smelting of copper and lead ores, an attempt at lead-refining possibly for silver extraction, the forging of copper and iron artifacts, and the recycling of brass and bronze alloys obtained from other locations in the Spanish colonial mercantile system.

The excavations at Paa-ko indicate that there was a shifting emphasis on different minerals over time. Throughout the use life of the facility, certain remodeling episodes were associated with the shift in focus from copper bearing ores to lead bearing ores. The earliest working surface of the industrial terrace at Paa-ko is heavily embedded with ground copper carbonate ore and copper slag, a byproduct of the smelting operation. Stratigraphically, this surface is immediately capped by another use episode containing features, ores and byproducts primarily associated with metallurgical processing of lead sulfate ores. By the end of the use life of the facility, the excavated material again is dominated by copper carbonate ores and associated smelting debris.

Other aspects of the metallurgical terrace suggest the inclusion of Puebloan technological practice within the facility. Within one of the surfaces associated with lead ore processing, features associated with lead glaze ceramic production were encountered. These consisted of a series of tabular cobble pedestals within a bed of wood charcoal containing fragments of lead ore, reminiscent of ceramic firing platforms encountered at sites in the Galisteo Basin and documented ethnographically (Plog 1997). Puebloan masonry and adobe construction techniques composed most of the smelting terraces walls and features. Adobe used at the site is both puddled, a traditional indigenous technique of adobe manufacture in the Southwest, and made into bricks, a Spanish technological introduction. Both techniques for manufacture use a fabric containing a high sand content and straw or grass inclusions that is different in composition from pre-colonial period adobe recovered from excavations at the site. Of particular interest is the apparent inclusion of ventilation systems reminiscent of Kiva ventilation shafts within the open air combustion features of the terrace. These features

are adobe and stone lined shafts linking ventilation openings with bin-like features most likely used for the reprocessing of metals and the forging of iron (Lycett 1999).

This evidence for syncretism in the technology at Paa-ko, interpreted in light of the historical documents of prospecting expeditions, can be viewed as representing the inclusion of Pueblo individuals into the basic operations of the smelting and metal processing technology. The shift in ore use over time may represent a shift in the relationship between the technological system at Paa-ko and the resources within the landscape of the San Pedro Valley. The relationship between landscape and mining technology, as demonstrated in the historical and ethnographic data sets, was often mediated by Pueblo people. The switch from copper ores to lead ores and back again can be read as a process of negotiation between Puebloan and Spanish colonial knowledge and values concerning ore types. As indicated from the ethnographic record, a demand for particular minerals probably directly affected the preparation of ritual material. As most likely the proprietary rights of Kiva societies, Spanish mineral demands would have directly conflicted with the organizational and political structures of the Pueblo.

DISCUSSION AND POST-SCRIPT

The continuity exhibited in Puebloan practice concerning mineral use through the early colonial period, as evidenced by the continuation of mining practices in the Bethsheba mine, in the distribution and production of lead glaze at San Marcos Pueblo, and in the incorporation of pre-colonial practices and mineral preferences in the metallurgical technology at Paa-ko, not only demonstrates a penchant for Spanish colonial industry to develop along pre-colonial roots, but also a direct involvement of Puebloan technological knowledge within one of the primary industries of early colonial New Mexico. This syncretism highlights the position of Puebloan agency within two spheres of collective action: 1) the production of ritual paraphernalia under the auspices of Kiva societies and the signaling of such association on the design fields of glazed ceramics, and 2) the Spanish colonial mining industry and associated systems of value, linking qualities of minerals to wealth acquisition and social mobility. Occupying a space between the two, Pueblo artisans participating in metallurgy and mining technologies could potentially join both spheres of action. This could allow for communities of practitioners to mobilize traditional networks of social relationships within the newly established colonial technological system in order to manipulate the system to a community's advantage. Such collective actions would allow for communities to use traditional knowledge to gain benefits within the colonial system such as access to livestock or colonial exchange relationships, as evident at Paa-ko. It could also allow for

effective resistance to colonial demands to develop through the mobilization of communities of practice in opposition to the industry and through the assertion of contrary material meanings and values occupying the same technological space.

The effective mobilization of resistance through collective action that crosscuts indigenous and colonial networks is documented in the historical record of Pueblo rebellion to Spanish rule. Many of the individuals linked to the organization of rebellion in the last half of the 17th century occupied such spaces, working within both collectivities. Esteban Clemente, a Spanish appointed governor of the Salinas pueblos, instigated revolt in the 1660's through bridging Catholic and traditionalist communities. His dual involvement in the Spanish government and Kiva societies most likely gave him both authority and the ability to mobilize action between the two social networks (Kessell 1987; Knaut 1995). Clemente's rebellion was short lived and unsuccessful, but similar mobilizations occurred in the successful rebellion of 1680. Based on a re-vitalization of Katchina imagery and symbolism, coupled with the appropriation of Spanish symbols of power, disparate Pueblo groups joined in rebellion through exploiting the networks of communication present between Kiva societies and within mission communities.

The revolt of 1680 also marked the end of the glaze ware tradition. Glaze ware was no longer made in either Western or Eastern Pueblos and was replaced by matte-paint polychromes. As Barbara Mills has demonstrated for Zuni, these wares replace pre-revolt wares, such as Hawikuh Glaze Ware, and demonstrate striking similarity in decorative style between different pueblos. Significantly, Katchina imagery is also absent from the new decorative medium. Mills suggests that at Zuni, the break with glaze paint technology was due to its association with its introduction in the mission system (Mills 2002: 93). This also suggests that the layering of meanings within glaze paint technology became either unnecessary or unwanted. The extraction of lead minerals from the Bethseba mine also appears to have ceased until well into the re-establishment of the colony in the 1750's. The use of these minerals are disassociated from Katchina imagery in ceramic production and yet are used to express the visual effect of revolt in their use in face paint by the rebels and in the directive by the leaders of the revolt to re-institute the painting of Katchina masks.

CONCLUSION

The technological syncretism recognized in both metallurgical practices and the glaze paint technology of the early colonial period in New Mexico can be viewed as an uneasy layering of meaning and practice specific to its historical moment. The apparent mixing of cultural elements recognized from our distanced perspective as investigators

of material culture belies the underlying historical tensions and processes of negotiation that led to the creation of such industries. Viewing these resultant practices as a nexus for the mobilization of collective action that crosscuts the diverse social networks present within early colonial communities places an emphasis on understanding the conflicting meanings embodied by the material culture of colonialism. Similarly, this shifts our focus in the attempt at understanding resistance to colonial domination from a model that posits competing static cultural entities engaged in individual struggles of resistance, to a model that recognizes the shifting associations and mobilizations of collective action linking communities of practice across seemingly opposed cultural institutions.

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