

NEW INSIGHTS INTO THE TIWANAKU STYLE OF SNUFF TRAYS FROM SAN PEDRO DE ATACAMA, NORTHERN CHILE

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Snuff trays are conspicuous objects that are found in archaeological contexts throughout Andean South America. At San Pedro de Atacama, in northern Chile, snuff trays that exhibit iconographic motifs similar to those found on Tiwanaku megalithic monuments have been assigned to the Tiwanaku style. In the present work, we propose a new definition for this style based on the occurrence of three morphological features: an overall trapezoidal shape, incurving sides, and sharp top corners. This group includes trays with iconography from the previously defined Tiwanaku style, as well as other trays without iconography. Principal component analysis shows that Tiwanaku-style trays with and without iconography make up a single group that is significantly different from plain, largely rectangular San Pedro-style trays. The relative proportion of Tiwanaku-style trays with and without iconography does not differ between cultural periods and archaeological sites. The results point to shape as an important trait for assigning trays to styles. Furthermore, the results show that during the Middle period four main types of snuff trays were in use: Tiwanaku trays with and without iconography and local San Pedro trays, also with and without iconography. We explore the possible social implications of this co-occurrence of styles.

Las tabletas de inhalación son objetos arqueológicos conspicuos de San Pedro de Atacama (norte de Chile); aquellas que exhiben motivos iconográficos inspirados en los monumentos megalíticos de Tiwanaku han sido adscritas al estilo Tiwanaku. En este trabajo se propone una nueva definición de este estilo que incluye la presencia simultánea en las tabletas de tres caracteres morfológicos: forma trapezoidal, lados aproximadamente hiperbólicos y esquinas superiores agudas. Este nuevo grupo de tabletas incluye todas aquellas definidas previamente como de estilo Tiwanaku (con iconografía) y agrega un conjunto de tabletas sin iconografía Tiwanaku. Un análisis de componentes principales mostró que las tabletas de estilo Tiwanaku con y sin iconografía constituyen un grupo único, significativamente distinto del grupo de tabletas esencialmente rectangulares de estilo San Pedro. La proporción de tabletas Tiwanaku con y sin iconografía no difirió entre distintos períodos culturales y distintos sitios arqueológicos. Los resultados señalan que la forma es un criterio importante para la asignación de las tabletas de inhalación a estilos. Adicionalmente, los resultados indican que durante el Período Medio cuatro tipos de tabletas fueron preferentemente empleados por la población local: tabletas de estilo Tiwanaku con y sin iconografía y tabletas del estilo local San Pedro, también con y sin iconografía. Exploramos posibles implicancias sociales que pueden inferirse a partir de esta coexistencia estilística.

The South-Central Andes encompass what is today northern Chile, part of northwestern Argentina, and the Bolivian altiplano, including the inter-Andean valleys (Figure 1). During prehistory, this area was characterized by lower population densities compared to the Central Andes, with relatively small populations living off the most productive ecosystems, separated by wide stretches of hyperarid deserts, high

mountains, and salt lakes (Nielsen 2013). As in other regions of the Andes, ecological complementarity was essential for social and biological reproduction in this area, as has been attested from the very first colonization of this part of the continent (Latorre et al. 2013). From the Formative period onwards (ca. 1000 B.C.–A.D. 1500), there is ample archaeological evidence of increased social interaction and complementarity

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Figure 1. Map of the South-Central Andes.

between a diverse array of agro-pastoral communities. Different models have been proposed to explain the mechanism behind these interactions, including the “vertical archipelago” model (Murra 1972), the “altiplano model” (Browman 1980), and the “circuit mobility” model (Núñez and Dillehay 1979). These models emphasize environmental determinants and the economic need to access resources from different ecozones. Nonetheless, in the Andes, economic exchange was based on social relations and thus trade was part of a wider net of connections that included kin relations and political alliances among families, groups, and polities that were linked across the landscape. The movement of non-local objects and styles was the result of the operation of this social network, but at the same time it was a means through which the different interacting groups materialized and reproduced their collective identities. In this context, prehistoric styles and their geographical distribution indicate not only interaction, but also changes through time in the social organization of the South-Central Andes. The Middle period is especially relevant because of the influence exerted by the Tiwanaku polity—possibly the first state society of the South-Central Andes—on a wide array of local communities, from Moquegua in the north to San Pedro de Atacama (SPA) in the south (see Figure 1; Stanish 2002). In fact, during this period, regionally shared icons occur throughout the area, suggesting some sort of religious integration; Isbell (2008) refers to these shared icons as the Southern Andean Iconographic Series (SAIS). Tiwanaku influence on SPA has been the subject of much debate in the past (see, for example, Salazar et al. [2014] and references therein). Today, most scholars agree that this influence was mostly ideological in character, as part of “clientist” or “hegemonic” strategies by the highland state, and that it was materialized by the distribution of highly iconic objects, such as ritual paraphernalia decorated with a corporate style, including the SAIS (e.g., Berenguer 1998; Uribe and Agüero 2004). Among these objects, wooden snuff trays played a prominent role (Berenguer 1998; Llagostera 2006; Torres 2001a). In this paper, we focus on wooden snuff trays from SPA and discuss their stylistic variability. We seek to understand the style to which undecorated trays

can be attributed and the social significance of the coexistence of local and Tiwanaku styles within burials and cemeteries in SPA.

San Pedro de Atacama and the Hallucinogenic Complex

In South-Central Andean prehispanic societies, the consumption of hallucinogenic preparations in religious contexts was a common practice (Schultes et al. 1998). Hallucinogens, principally of plant origin, were mainly consumed by smoking, drinking, and taking snuff. The main paraphernalia associated with these respective activities were smoking pipes, a type of drinking vessel called a *kero*, and snuff trays. Although all these different types of ritual paraphernalia have been found in SPA, they were not coeval. Ceramic pipes were common during the Late Formative period (ca. A.D. 100–400), but during the Middle period (A.D. 400–1000) they were gradually replaced by wooden snuff trays, which were used until Inka times. *Keros* made of wood, ceramics, or metal are also associated with the Middle period, even though they appear during later periods as well. The circulation and use of these ritual objects was part of wider social relations that integrated the local society of SPA with the rest of the South-Central Andes, where they have also been reported in the same time periods. As social fields changed through time in the region (e.g., Stovel 2008), so did this ritual paraphernalia. The appearance, disappearance, and relative abundance of pipes, snuff trays, and *keros* in local graves indicate significant transformations in ritual practices, as well as changes in the economic and social networks in which the local community was integrated. Interesting differences occur in the shape and decoration of these artifacts—especially snuff trays—within each period. The coexistence of different styles suggests that ritual practices using snuff trays had different implications or meanings and, furthermore, that the style of the trays conveyed information about social differences within the local community. Therefore, an analysis of changing patterns of stylistic distribution in snuff trays provides us with an opportunity to better understand the social organization of local communities in SPA and its relation to the South-Central Andes as a whole. This

is especially the case when considering the regional presence of shared iconographic motifs before Tiwanaku influence (e.g., Isbell and Knobloch 2006), as well as the spread during the Middle period of a variable yet recognizable corporate style in distant provinces. SPA is a privileged place to accomplish such an analysis, since its small cluster of oases located in the hyperarid core of the Atacama Desert (Figures 1 and 2), more than 800 km from the Tiwanaku heartland, played a key role in regional interaction since the Formative period (e.g., Núñez and Dillehay 1979; Tarragó 1984, 1989) and developed strong links to the Tiwanaku state during the Middle period (Berenguer and Dauelsberg 1989; Thomas et al. 1984). Besides, being situated in one of the driest deserts of the world allows for exceptional preservation of archaeological materials, including wooden objects such as the snuff trays (Berenguer 2004; Blanchette et al. 1990).

Snuff trays are among the most conspicuous objects found in funerary contexts in SPA, especially during the Middle and Late Intermediate periods (A.D. 1000–1450). Although a few stone and bone snuff trays have been found, the vast majority of them are made of wood. An examination of snuff trays available from SPA shows enormous variability in size, shape, structural complexity, type of decoration, and iconographic motifs (Torres 1987a). Numerous studies have addressed this variability, particularly in trays which contain stylistic elements of the SAIS—which most scholars still refer to as “Tiwanaku style” because of the presence of icons found on the megalithic monuments of the great highland capital (Barón 1984; Berenguer 1985, 1987, 1998, 2001; Latcham 1938; Llagostera 1995, 2001, 2006; Llagostera et al. 1988; Looser 1926; Loza 2007; Mostny 1968–1969; Núñez 1963; Oyarzún 1931; Serracino 1980; Thomas and Benavente 1984; Thomas et al. 1984, 1985; Torres 1984, 1986, 1987a, 1987b, 1998, 2001a, 2001b, 2004; Torres and Conklin 1995; Uhle 1913, 1915; Wassén 1965, 1972). Other trays lacking elements of the SAIS have traditionally been referred to as non-Tiwanaku-style trays and have received much less attention, even though they make up nearly 90 percent of the collection (Llagostera 1995; Torres 1984, 1986; Uhle 1913). Scholars studying these latter trays have mainly proposed

features characterizing a style different from Tiwanaku and have described its geographical distribution and chronology (Hermosilla 2001; Krapovickas 1958–1959; Llagostera 1995, 2001; Llagostera et al. 1988; Núñez 1963; Thomas and Benavente 1984; Torres 1986). Recently, one of us has undertaken a thorough study of trays available at the local SPA museum and several museums worldwide. She has defined the Circumpuneño (Horta 2012) and the San Pedro (Horta 2014) styles for many trays lacking Tiwanaku iconography. The Circumpuneño style includes volumetrically carved anthropomorphic and zoomorphic figures performing ceremonial activities and has been dated to the Late Intermediate period. In contrast, the San Pedro style may depict volumetrically carved human figures or appear as undecorated, largely rectangular trays dated to the Late Formative, Middle, and Late Intermediate periods. Nearly half of the presently known snuff trays lack iconography and volumetric carvings (i.e., they are plain snuff trays) and have therefore been difficult to assign to particular styles. The present work builds on preliminary observations that some of these plain snuff trays show a close morphological resemblance to those with Tiwanaku iconography (Figure 3; Berenguer 1987:50–51, note 5; 1993:61, note 11; 1998:31; 2001:80, note 4) and could therefore be considered part of that style. If this turned out to be the case, then the number of Tiwanaku trays currently known from SPA would increase significantly, suggesting that the highland state played an important role in the introduction of snuff-taking practices and possibly in the disappearance of local smoking rituals.

In this paper, we follow these insights to propose a new and broader definition of the Tiwanaku style to include undecorated snuff trays with an overall trapezoidal shape, incurving sides, and sharp top corners. A number of statistical tests show that such trays with and without Tiwanaku iconography indeed correspond to a single distinct set, and further that Tiwanaku-style trays without iconography are different from the similar largely rectangular trays previously assigned to the San Pedro style.

Based on the assumption that styles are ways of doing that should show regular spatial and temporal structures (Davis 1990), we studied the

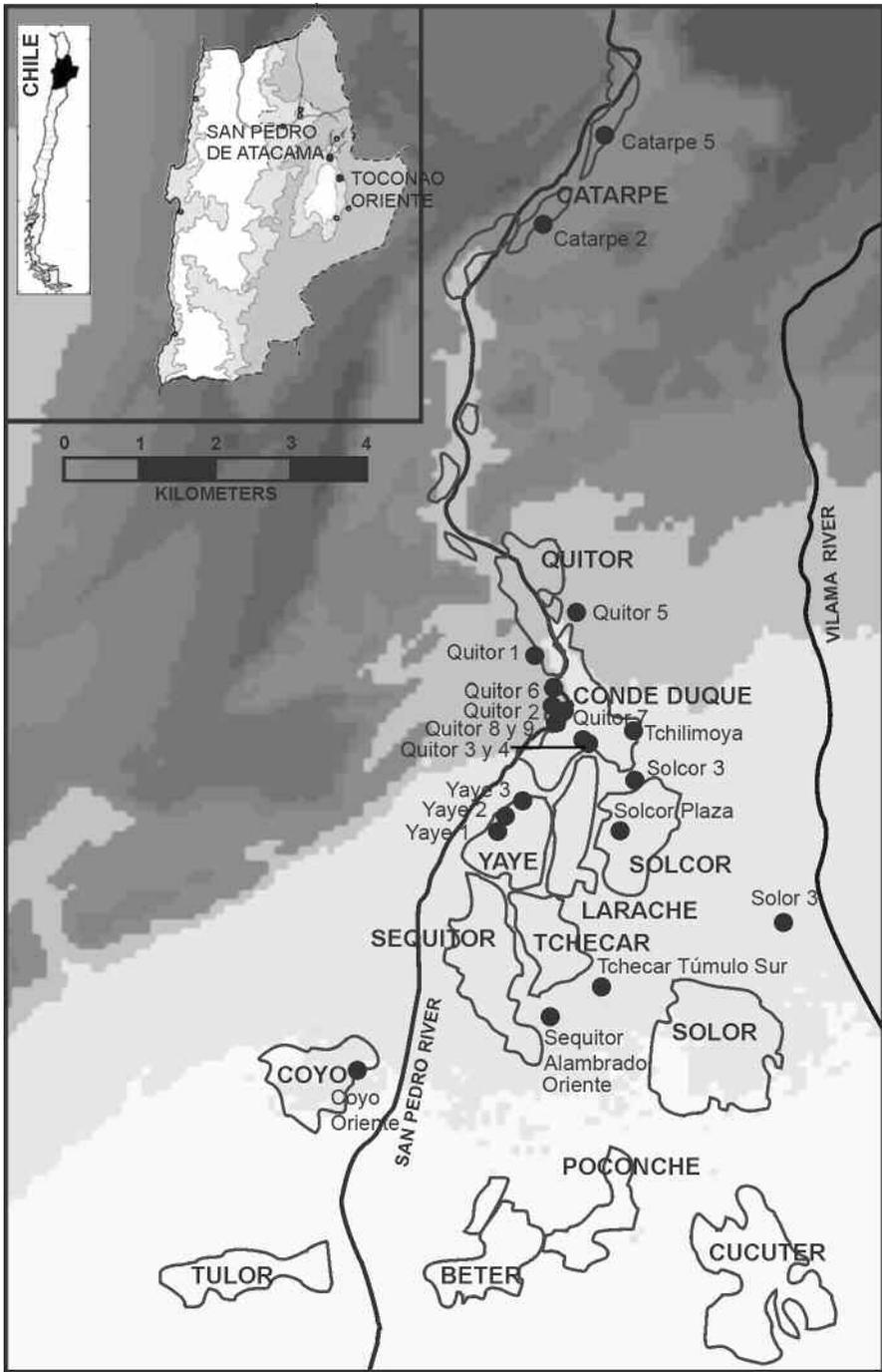


Figure 2. Map of San Pedro de Atacama showing archaeological sites mentioned in the text.

spatial and temporal distribution of the Tiwanaku-style trays in SPA. In addition, we tested the contextual co-occurrence of Tiwanaku-style trays with and without iconography, as well as their

co-occurrence with other types of objects with Tiwanaku iconography. This is based on the idea that if the proposed broader definition of Tiwanaku style is correct, then all types of Ti-



Figure 3. Tiwanaku-style snuff trays: (left) with iconography; (right) without iconography. Photographs reprinted with the permission of IIAM.

wanaku-style objects should co-occur within a given cultural period (particularly the Middle period). At the same time, assuming that Tiwanaku trays with and without iconography may have had different social connotations in the past, we reconstructed contextual associations in burials in order to determine whether social differences, measured as the contextual diversity and relative presence of prestige items in individual tombs, could explain stylistic differences. Finally, we sought to determine possible differences in the origin of raw materials employed in the manufacture of trays and to assess whether eventual differences correlated to style.

Materials and Methods

Objects Studied

The basis for this study was the set of wooden snuff trays found in cemeteries in the Salar de Atacama area (Catarpe, Coyo, Quitar, Sequitor, Solcor, Solor, Tchecar, Tchilimoya, Toconao, and Yaye; see Figure 2). In all cases, the artifacts come from cemeteries with similar burial patterns that were in use throughout the Late Formative,

Middle, and Late Intermediate periods (Le Paige 1964; Torres-Rouff 2008). The chronology of these cemeteries is difficult to assess because most of them were occupied during two or even three consecutive cultural periods. Contextual associations were used to assign single tombs to specific cultural phases. The final set studied consisted of 568 snuff trays. While most trays could be directly examined at the Instituto de Investigaciones Arqueológicas y Museo R.P. Gustavo Le Paige S.J. (IIAM), 28 trays were analyzed through photographs or drawings from the literature.

The morphological features shared by trays with Tiwanaku (TIW) iconography were first determined. Such features were: (1) trapezoidal shape (i.e., trays wider at the top than at the bottom), (2) incurving sides, and (3) sharp top corners (Figure 4). Trays without iconography, ranging from largely rectangular to trapezoidal in shape, were then examined for the occurrence of the features listed above. Trays exhibiting those three features were assigned to the Tiwanaku style, and those that did not were assigned to the San Pedro style. Figure 5 illustrates some San Pedro-style trays and indicates those features that distinguish them from Tiwanaku-style trays without iconography.

The morphological features described above were then quantitatively assessed as follows, using the measurements labeled in Figure 4: (1) trapezoidal shape as $[(a - b) / d]$; (2) incurving of sides as (c / d) ; (3) and sharpness of top corners as (e / d) . Morphological data were then analyzed by principal component analysis (PCA) to assess whether Tiwanaku-style trays with and without iconography could be considered a homogeneous set and whether the set of Tiwanaku-style trays without iconography was distinguishable from the set of plain San Pedro-style trays. Mahalanobis distances, including principal components with eigenvalues larger than one, were used to discriminate between the three sets of trays (Hua and Wiens 2009). Comparisons were performed between the centroids of Tiwanaku-style snuff trays with and without iconography and those of trays assigned to the San Pedro style. In each case, a non-parametric analysis of variance (ANOVA) tested for significance of differences between styles.

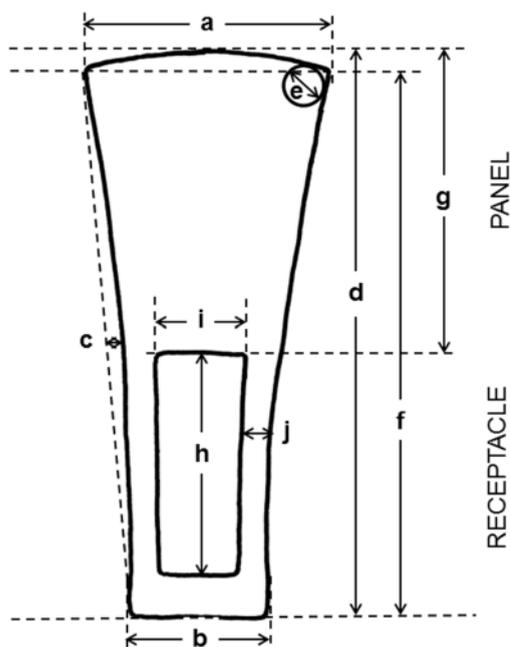


Figure 4. Drawing of a Tiwanaku-style snuff tray indicating morphological parameters measured.

Finally, a second PCA involving additional morphological tray features was performed in order to judge the importance of the three morphological features described above in distinguishing between styles. The following parameters were calculated (see Figure 4): (4) curvature of top side, defined as $[1 - (f / d)]$; (5) length of panel relative to length of receptacle, defined as (g / h) ; (6) thickness of lower border of receptacle relative to length of tray, defined as $[(d - g - h) / d]$; (7) width of receptacle relative to length of tray, defined as (i / d) ; and (8) thickness of sides of receptacle relative to length of tray, defined as (j / d) . The values of parameter h were determined as the mean of three measurements taken on the left side, center, and right side of the receptacle; values of the parameter j were similarly determined as the mean of four measurements taken at the top and bottom of both sides of the receptacle.

Our analysis allowed for a total of 120 trays (57 with iconography and 63 without) to be assigned to the Tiwanaku style (Table 1). Measurement of all quantitative features was possible in

only 102 of these trays (43 with iconography and 59 without); the remaining trays were either poorly preserved or, being physically absent from the collection, could not be properly measured from field notes or graphical representations. The group of San Pedro-style trays consisted of 100 artifacts. The morphological features defined above could be measured for 94 of them.

Association of Trays with Cultural Periods and Funerary Context

In the absence of direct dates for snuff trays excavated from SPA oases, chronology was inferred from contextual associations in tombs, mostly based on the styles of pottery accompanying the trays (Berenguer et al. 1986; Stovel 2013; Tarragó 1968, 1989) and a few radiocarbon dates (Llagostera et al. 1988). It was possible to assign 67 Tiwanaku-style trays (29 trays with iconography and 38 without) to a cultural period (Table 1).

The descriptions of funerary offerings associated with the trays were obtained from the original excavation notes of Father Gustavo Le Paige. Such descriptions were found for only 100 Tiwanaku-style trays (Table 1); the tombs corresponded to individual burials in 59 cases and to multiple burials (2 to 15 individuals) in 41 cases. The objects accompanying the snuff trays in the tombs were very diverse, including the following: ceramic objects, bowls, vases, textiles, headdresses, spindles, threaders, needles, hole punchers, pigments, baskets, boxes, bows, arrow points, arrow shafts, axes, mallets, chisels, tweezers, spoons, vegetable residues, squashes, urns, snails, animal bones, flutes, necklaces, bracelets, rings, metal or gemstone ornaments, gemstone beads, and complementary snuff-taking paraphernalia (snuff tubes, spatulas, small mortars and pestles, and snuff-powder containers). Two quantitative approaches were used to infer the relative status of the burials containing wooden snuff trays: a diversity index that considered the number of types of objects found within the burials, and the occurrence in the tomb of metal objects such as axes, mallets, tweezers, bracelets and rings, taken as a proxy for social status of the individual interred (Llagostera et al. 1988; Salazar et al. 2014; Tamblay 2004). Other prestige items—such as decorated pottery vessels, *keros*, and imported textiles—were too scarce to be incorporated into quantitative analyses.

Table 1. Provenience and General Features of Snuff Trays Included in the Present Study.

Archaeological site	Tiwanaku style without iconography					Tiwanaku style with iconography					Plain San Pedro style
	All	With all measures	With cultural period	With wood density	With context	All	With all measures	With cultural period	With wood density	With context	
Catarpe 2	1	1			1						3
Catarpe 5	1	1	1	1	1	1	1	1	1	1	4
Coyo Oriente	7	7	3	5	7	16	12	2	6	15	12
Quitor 1	1	1	1	1	1						3
Quitor 2	4	4	3	1	3	3	2	2	1	3	2
Quitor 3											1
Quitor 4											1
Quitor 5	11	10	10	8	11	8	5	6	3	8	12
Quitor 6	17	16	13	11	17	9	6	5	3	9	16
Quitor 7	1	1			1						
Quitor 8						2	2	1	1	1	
Quitor 9	1	1									
Sequitur Alambrado Oriente	2	2	1	1	2	3	2	2	1	2	5
Solcor 3	6	5	4		3	9	8	8	3	8	3
Solcor Plaza	1	1		1	1						6
Solor 3	1	1		1	1	1	1			1	1
Tchecar Túmulo Sur	2	2	2	2	2						13
Tchilimoya	1	1		1							1
Toconao Oriente						2	1	2	1	2	3
Yaye 1											3
Yaye 2											2
Yaye 3											2
Unknown	6	5				3	3				7
TOTALS	63	59	38	33	50	57	43	29	20	50	100

Origin of Snuff Tray Wood

Recent studies have addressed the origin of wood species used in the manufacture of snuff trays from SPA (Niemeyer 2013; Niemeyer et al. 2013; Riquelme 2012; Riquelme and Niemeyer 2014). Two groups of wood species were defined on the basis of density measurements: wood with densities between .46 and .73 g/cm³ (the range of native species) and wood with densities beyond this range (corresponding to species found outside SPA) (Niemeyer et al. 2013).

Further Statistical Analyses

A multiple proportions test was used to compare the distribution of trays with and without Tiwanaku iconography in terms of sites, cultural periods, type of wood, and presence of metal objects. A t-test was used to compare the number of object types in tombs with single individuals containing Tiwanaku trays with and without iconography.

Results

In the PCA using three morphological features, one principal component with an eigenvalue larger than one (1.803) captured 60.09 percent of total variance. In the PCA using eight morphological features, three principal components with eigenvalues larger than one (2.738, 1.417, and 1.155) captured 66.38 percent of total variance. The first principal component captured 34.23 percent of total variance, the second 17.71 percent, and the third 14.44 percent. In the PCA using the complete set of morphological features, the three features used to define the Tiwanaku style contributed the most to the first principal component—that is, that which explains the highest percentage of the variance (see key to Figure 6). This strongly suggests that these three variables are necessary and sufficient to define the Tiwanaku style. The Kruskal-Wallis test on Mahalanobis distances (Figure 6) supports the proposal that Tiwanaku-



Figure 5. Plain San Pedro-style trays, with IIM catalog numbers indicated. Their morphological characteristics distinguish them from Tiwanaku-style trays without iconography, described as: T (trapezoidal), H (incurving or hyperbolic), TC (sharp top corners). (289) T, H, non-TC; (227) non-T, H, TC; (11) T, non-H, TC; (83) non-T, non-H, TC; (303) non-T, non-H, TC; (91) non-T, non-H, non-TC. Photographs reprinted with the permission of IIAM.

style trays with and without iconography conform to a single group that differs from the largely rectangular San Pedro-style trays. Thus, p -values for the 3- and 8-variable PCAs using the three centroids were all less than .001. Tiwanaku-style trays with and without iconography did not differ significantly and San Pedro-style trays differed significantly from Tiwanaku-style trays in all but one case. This exception occurred when distances to the centroid for the San Pedro style were considered, in which case the three types of trays differed significantly from each other (Figure 6). Nonetheless, p -values for pairwise comparisons were .020, less than .0000, and less than .0000 for Tiwanaku-with iconography vs. Tiwanaku-without iconography, San Pedro vs. Tiwanaku-with iconography, and San Pedro vs. Tiwanaku-without iconography, respectively. This suggests that even in this case there is a trend, albeit non-significant, for Tiwanaku-with iconography trays to resemble the Tiwanaku-without iconography ones, and for both Tiwanaku trays to differ from the San Pedro-style trays.

Sixty-seven Tiwanaku-style trays with and without iconography could be assigned to the following cultural periods: Late Formative or Middle

periods (25 trays), Middle period (39 trays), and Late Intermediate period (3 trays). Considering that some pottery styles occur during both the Late Formative and the Middle periods, it was not always possible to separate them. Furthermore, even though Tarragó (1989) has identified associations between Tiwanaku materials and Rojo Pulido ceramics (considered a Formative ware), recent research by Stovel (2013) using radiocarbon dating from tombs containing Rojo Pulido ceramics demonstrates that this type was still in use during the Middle period. Therefore, it cannot be argued that Tiwanaku-style iconography is earlier in SPA than in the heartland, as Isbell and Knobloch (2006) contend. On the contrary, available radiocarbon dates and cultural associations indicate that most Tiwanaku-style trays were found in tombs from the Middle period, when Tiwanaku influence in SPA was at its peak (Berenguer and Dauelsberg 1989; Llagostera 2004; Thomas et al. 1985). A multiple proportions test showed that the proportion of Tiwanaku-style trays with and without iconography did not differ significantly between cultural periods ($\chi^2 = .0067$; $df = 2$; $p = .997$), so the two variants seem to be coeval.

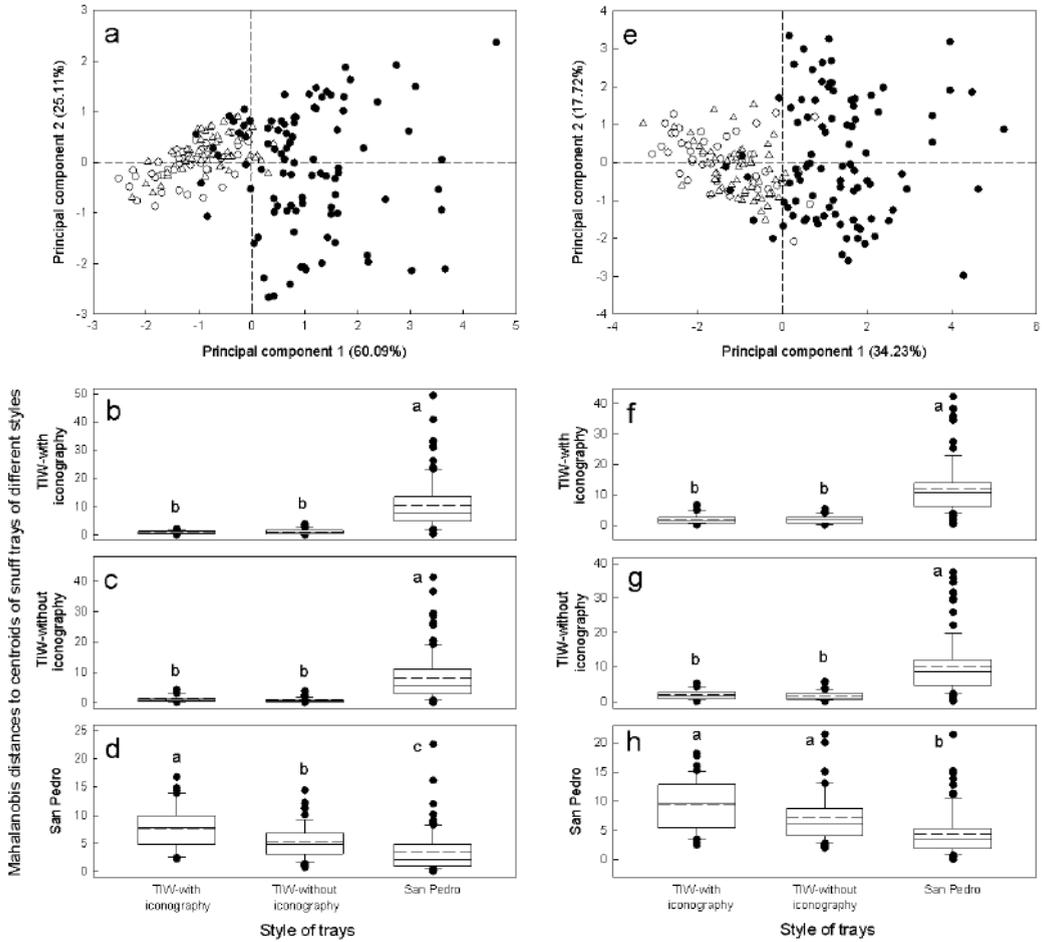


Figure 6. Principal component analysis: (a–d) using only the three main features used to define the Tiwanaku style, and (e–h) using all eight morphological parameters defined in Materials and Methods. In sections (a) and (e) the following symbols were used: ○ = Tiwanaku trays with iconography; Δ = Tiwanaku trays without iconography; ● = San Pedro trays. Coordinates for principal component 1 were $-.843, -.813, \text{ and } .657$ for section a, and $-.730, -.742, .656, .541, -.629, .406, -.250$ and $.554$ for section b, for the morphological features taken in the same order given in Materials and Methods, respectively. Coordinates for principal component 2 were $-.221, -.376, \text{ and } -.750$ for section a, and $.048, .309, .558, -.674, .430, .205, .499, \text{ and } -.279$ for section b, for the morphological features taken in the same order given in Materials and Methods, respectively. Box plots (b–d) and (e–h): Mahalanobis distances from centroids of Tiwanaku-style trays with (sections b and f) and without iconography (sections c and g), and plain San Pedro-style trays (sections d and h). Results of Kruskal-Wallis ANOVA are shown with letters above the bars: different letters indicate significant differences ($p < .05$). The boundary of the box closest to zero indicates the twenty-fifth percentile, the solid line within the box shows the median, the dashed line within the box shows the mean, the boundary of the box farthest from zero indicates the seventy-fifth percentile, the whiskers (error bars) above and below the box indicate the ninetieth and tenth percentiles and the black circles are outliers.

Of the 120 snuff trays identified as Tiwanaku in style, only 111 can be assigned to an archaeological site (54 of the trays with iconography and 57 without; see Table 1). Information on the other 9 trays has disappeared. A multiple proportions test showed that the proportion of trays with and without iconography did not differ significantly

between sites ($\chi^2 = 18.39; df = 17; p = .365$). The co-occurrence of Tiwanaku-style trays with and without iconography could also be shown within tombs belonging to the same period at certain sites (Table 2). Nonetheless, since cultural periods correspond to broad time ranges, a further comparison was performed within multiple and indi-

Table 2. Co-occurrence of Tiwanaku-Style Trays with and without Iconography within Different Archaeological Sites in Tombs Belonging to the Same Cultural Period.

Cultural period	Site	Tiwanaku-style trays	
		With iconography	Without iconography
Late Formative (ca. A.D. 100–400) or Middle (ca. A.D. 400–1000)	Quitor 2	1	3
	Quitor 6	1	6
	Solcor 3	4	3
Middle (ca. A.D. 400–1000)	Coyo Oriente	2	2
	Quitor 5	5	10
	Quitor 6	4	6
	Solcor 3	4	1
Late Intermediate (ca. A.D. 1000–1450)	Catarpe 5	1	1

vidual tombs. In one such case, a Tiwanaku-style tray with iconography co-occurred with one without iconography: trays IIAM 372 and IIAM 214, which were found in Coyo Oriente tombs 4049-4050, containing two individuals (Figure 7).

Wood density of 53 Tiwanaku-style trays (20 with iconography and 33 without; see Table 1) was extracted from the literature (Niemeyer 2013; Niemeyer et al. 2013). A multiple proportions test showed that the proportion of trays with and without iconography did not differ significantly

between trays with wood in the categories exogenous to SPA and native or exogenous to SPA ($\chi^2 = .362$; $df = 1$; $p = .548$).

Trays are often accompanied by other snuff-taking paraphernalia, such as snuff tubes. A study was performed on the style of trays accompanying tubes decorated with Tiwanaku iconography (15 cases). In nine cases, the accompanying trays exhibited Tiwanaku style with iconography; in four cases, the style of the tray was not clearly definable; and in two cases a Tiwanaku-style tray without iconography accompanied a tube with Tiwanaku iconography. In one of these latter cases, a second tray in plain San Pedro style also accompanied the tube (Figure 8).

The context of 100 Tiwanaku-style trays (50 with iconography and 50 without) could be traced, and the diversity index and proxy for wealth status of each funerary offering could be evaluated. The diversity index for tombs in which a single individual was interred was not affected significantly by presence or absence of iconography in the Tiwanaku-style trays found in the tomb (t test: $t = -.203$; $df = 57$; $P = .840$). Metal objects were similarly associated with trays with and without iconography ($\chi^2 = 1.329$; $df = 1$; $p = .249$).

Discussion

The comparison of data for Tiwanaku-style snuff trays with and without iconography by PCA, followed by ANOVA of Mahalanobis distances, shows that the two sets of trays are not distinct in terms of the measured morphological features. Moreover, the analyses showed statistically significant differences between plain, largely rec-



Figure 7. Tiwanaku-style trays with and without iconography co-occurring in a tomb with two interred individuals: (a) tray IIAM 372 and (b) tray IIAM 214, both from Coyo Oriente tombs 4049-4050. Photographs reprinted with the permission of IIAM.

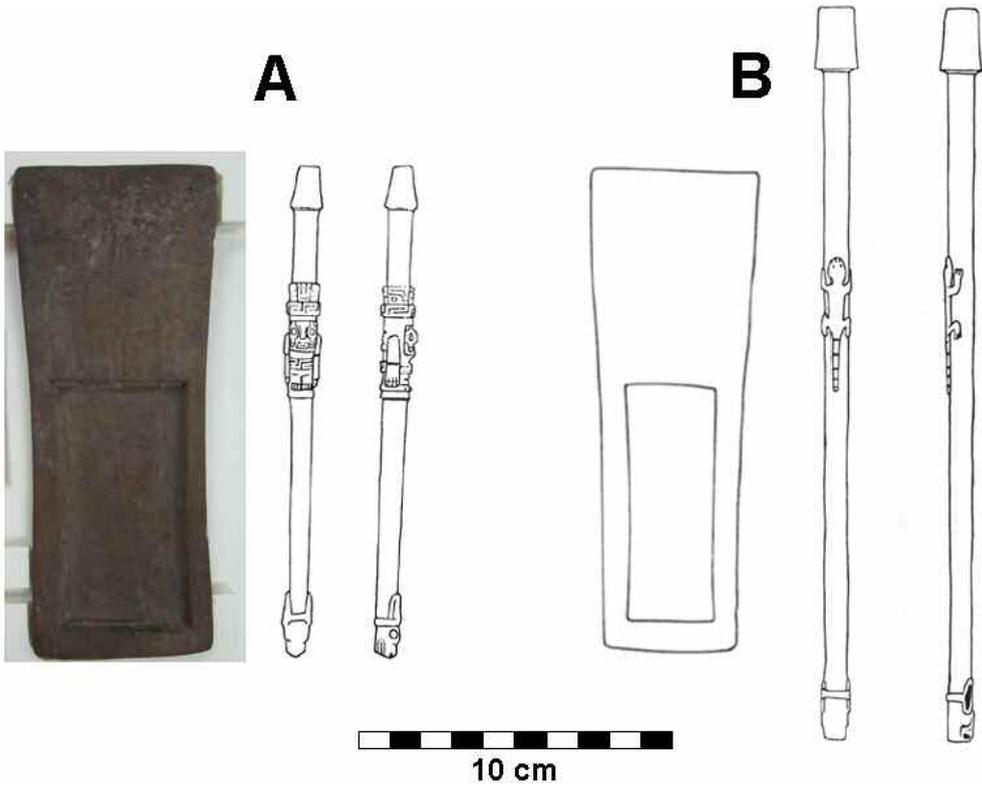


Figure 8. Two examples of the co-occurrence of a Tiwanaku-style snuff tablet without iconography with a snuffing tube with Tiwanaku iconography: (a) Solcor 3, tomb 76; (b) Solcor 3, tomb 112. Photograph by H. Horta. Drawings of tubes and tray reprinted from Llagostera et al. (1988).

tangular San Pedro-style trays and Tiwanaku-style trays. Multiple proportions tests and tray counts show that the proportions of both Tiwanaku subsets did not differ between cultural periods and in several instances they co-occur under comparable spatiotemporal circumstances. Taken together, these results strongly support the original proposal that the trapezoidal-incurving shape (Berenguer 1987:50-51, note 5, 1993:61, note 11) and sharp top corners are key features of the Tiwanaku style and suggest that shape, in addition to iconography and its vast array of symbols (Llagostera 2006; Torres 1984, 1986, 1987b, 2001a, 2004), may be an important way of conveying information on the origin and meaning of the object and its carrier, especially in visual systems not relying on written communication, such as was the case in the Andes. For example, it is well known that during Inka times the trapezoidal shape was emblematic for the Tawantinsuyu, and was systematically used by the state in architec-

ture and metal objects. Horta (2008) suggests that trapezoidal and circular metal emblems worn on the forehead of Inka nobles served as symbols of the lower and higher moieties of the Capac Ayllu of Cuzco. Therefore, our results are supported by other archaeological cases in the Andes and indicate that shape was indeed an important variable of the style of snuff trays. Through such formal variation, social information was conveyed (e.g., Hegmon 1992; Wobst 1977). This information was probably of an “iconological” (Sackett 1990) or even an “emblemic” (Wiessner 1983) character, inasmuch as the shape of the snuff trays would have informed social agents in the past if the object was affiliated with Tiwanaku or with a local tradition.

Tiwanaku-style snuff trays in SPA are more common than previously thought, particularly during the Middle period, when they make up nearly 50 percent of the total. Therefore, even though snuff-taking practices in SPA may have begun

during the Late Formative period (Llagostera 2004), the ubiquity of Tiwanaku trays suggests that the highland state played an important role in the increase of snuff-taking (Berenguer 1998) and the abandonment of the traditional use of pipes during the Middle period (e.g., Llagostera 2004; Thomas et al. 1984). A similar situation has been observed in the Middle period with the state-supported increased use of *keros* both in the Tiwanaku heartland (e.g., Bandy 2001) and in distant provinces such as Arica, in northern Chile (e.g., Berenguer and Dauelsberg 1989). These changes reflect deeper transformations in ritual practices stimulated by Tiwanaku, which affiliated some individuals to the state through the use of ritual objects with a corporate style. The latter included the trapezoidal-incurving shape introduced by Tiwanaku in the snuff trays of SPA. This shape may have occurred sporadically before the Middle period, but it is under the Tiwanaku influence that the use of this shape in objects with religious connotations became particularly frequent, not only in SPA but in many regions under the direct influence of the highland state (Alcalde 1995; Chacama 2001; de la Vega et al. 2002; García and Bustamante 1990; Llagostera 2001; Loza 2007; Rendón 2000; Wassén 1972). It is likely that SPA imported trays with this shape from Tiwanaku, but when it came to producing their own trays, either with exogenous or local materials, local craftsmen produced trays with distinct morphological features. These trays were in the plain San Pedro style; some resemble the Tiwanaku-style trays without iconography but exhibit distinctive shape patterns, while others clearly departed from such canon by incorporating human, zoomorphic, and anthropomorphic figures on the panel. Nearly 15 percent of the trays corresponding to the Middle period in SPA do not correspond either to the Tiwanaku or the SPA styles. Nonetheless, most of these trays could be the product of individual agency, errors in reproduction, and technological or temporal variability of the Tiwanaku or the SPA styles. At most five of the total universe of trays currently assigned to the Middle period clearly belong to other, not yet defined, styles, but their precise chronological position within the Middle period remains uncertain. Therefore, we may conclude that during the Middle period almost all snuff trays deposited in mortuary contexts

were associated with one of the four different groups mentioned above: Tiwanaku with and without iconography and SPA with and without iconography.

The corporate styles in the SPA trays expressed differences between their bearers in terms of relationships and affiliations with Tiwanaku state ideology. The fact that Tiwanaku-style trays coexisted with decorated and undecorated trays in the local style suggests that a complex scenario of social differences operated during the Middle period in SPA.

A consideration of the historical context in SPA at the time of Tiwanaku influence may clarify the social implications of this pattern of stylistic coexistence. Beginning during the Late Formative period, but especially during the Middle Period, the standardized production of local pottery styles (Stovel 2002, 2005; Tarragó 1976, 1989), the homogeneity of mortuary ritual and cranial deformation (Torres-Rouff 2007, 2008), as well as a characteristic textile decoration and technology (Agüero 2000, 2003), indicate a strong local social identity and group cohesion in SPA (Berenguer and Dauelsberg 1989; Salazar et al. 2014; Tarragó 1989; Torres-Rouff 2007). Nonetheless, during the Middle period, SPA society also showed significant internal social differences both within and between the different cemeteries, as seen in the differential distribution of prestige objects in individual tombs and differences in health conditions (Berenguer and Dauelsberg 1989; Llagostera 1995, 2006; Llagostera et al. 1988; Thomas et al. 1984; Torres-Rouff 2008, 2011). Previous research has also shown an increase in osteological markers of violence during the Middle period, as compared to previous moments (Torres-Rouff and Costa 2006), as well as significant differences in injury patterns and frequency between cemeteries with more or with less Tiwanaku influence and overall wealth (Torres-Rouff 2011).

Even though the use of snuff increased during the Middle period, the different styles in which the snuff trays were manufactured could have emphasized the internal divisions and different social affiliations that coexisted within the local community. Accordingly, it could be hypothesized that Tiwanaku-style trays with iconography are more frequent in the funerary offerings of higher-

status individuals in view of the additional artisan skills necessary for their production, which would have enhanced their material value, and also the potentially richer symbolic message they conveyed through state iconography (Isbell 2008). Nonetheless, the data reported here do not support this hypothesis. The diversity of objects in burials, as well as the frequency of status-related metal objects within them, did not differ between tombs containing Tiwanaku-style trays with iconography and those lacking iconography.

The question of the relative value of trays with and without iconography may also be examined from the point of view of the provenance of the wood used in their manufacture, under the hypothesis that trays with iconography were imported from Tiwanaku, whereas trays without iconography could have been produced locally. The data reported herein do not support this. Moreover, a recent study identifying the wood of a small set of snuff trays included two Tiwanaku-style trays with iconography and two without (Riquelme and Niemeyer 2013). In both groups, one tray was made with foreign wood, most likely from rain and montane forests close to Tiwanaku, and another with wood that may be of local origin (the two species involved do grow in SPA but show a wide distribution within the southern half of South America).

Our data thus show that the different styles of snuff trays found in SPA during the Middle period were not associated with political or status differences. On the one hand, the increased frequency of snuff-taking paraphernalia indicates that ritual practices associated with them were accessible to more members of the community during the Middle period, as compared, for example, with the previous use of smoking pipes (Thomas et al. 1984). The increase in snuff use probably created bonds between individuals of the local community who participated in them, as well as between these individuals and other polities, including the Tiwanaku state, where similar rituals occurred. On the other hand, Tiwanaku-style trays are not always associated with prestige objects or with graves with abundant offerings. Some Tiwanaku trays were even found in graves with no other or with very few other associated objects, while some tombs with metal objects and prestige items lack snuff trays altogether. Nevertheless, we cannot rule out the

possibility that, if other proxies for status are considered in the future, a different scenario may emerge. In any case, it is relevant to consider alternative social implications for the stylistic variability in snuff trays observed during the Middle period.

Results presented in this paper show that at least two styles, each with two subvarieties, coexisted during the Middle period. These styles were organized according to two sets of binary oppositions: local vs. non-local and with iconography vs. without it. This of course does not mean that the users of Tiwanaku-style trays were themselves foreigners. In fact, these trays appear associated with local offerings, in burials in the local fashion, and usually with individuals with cranial deformation in the “local style” (Salazar et al. 2014). Nonetheless, regardless of the symbolic meaning of these styles, their use must have created different personal affiliations, with some local individuals being recognized as affiliated with the Tiwanaku state and some others with the local SPA tradition. Additional differences may have been signaled by the presence or absence of iconography. It is interesting to consider the possibility that individual owners of snuff trays could have been recognized as affiliated with one of these four stylistic subgroups, since different styles of trays do not coexist within individual tombs, except for the case of collective burials.

Even though it is certainly not the only explanation, one possible line of interpretation is that these four stylistic sub-varieties were emblematic symbols of four different social groups forming part of the local community. If this interpretation is correct, then we should conclude that social differences signaled by the style of snuff trays were not materialized through the spatial disposition of the burials or oases (Thomas and Massone 1988), because individuals affiliated with each group appear in all cemeteries. On the contrary, this hypothetical social organization would have linked individual families and lineages of the different oases into a more encompassing social structure that ultimately constituted the “local community.” Certainly, further research is required to test these suppositions. But this line of inquiry seems to have potential. The fact that at least two of the social segments of the local community were affiliated with Tiwanaku would indicate that Tiwanaku influence in SPA was not

only ideological and religious, as the clientist or hegemonic model would have it (e.g., Berenguer 1998; Uribe and Agüero 2004), nor strictly economic, as the circuit mobility or the altiplano model would suggest (e.g., Berenguer and Dauelsberg 1989; Browman 1980; Núñez and Dillehay 1979), but that it also significantly transformed the local social organization as a result of the integration of San Pedro de Atacama communities into the political structure of Tiwanaku.

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