Numeral Graphic Pluralism in the Colonial Andes

Gary Urton, *Harvard University*

Abstract. What was the meaning, for Inca record keepers, of the knotted cord constructions they produced as administrative records for the Inca state? In particular, how did these administrators think about the knot constructions that (as we now understand) were used to sign numerical values? And what were the consequences for record keeping in the colonial Andes of the encounter between native cord keepers and the Spanish record keepers, with their numeral signs inscribed on parchment or paper? These are the questions that I explore in this paper. While we do not have explicit, first-hand testimony concerning the first two questions, there is a wealth of evidence relating to the interaction between native and European record keepers from the early years of the colony. The paper examines various contexts in which the cord keepers, who continued producing knotted-cord records long after the conquest, would have encountered written numerals and the implications of these encounters for questions of authority and legitimacy in the production of administrative records in the colonial Andes.

The Problem

The pursuit of research on the Andean knotted cords, known as *khipu* (Quechua: "knot"), has some curious consequences, especially when compared to the research task of colleagues who study other, better known—not to mention relatively fully deciphered—ancient writing systems. Most notably, students of the khipus cannot even claim unambiguously to be pursuing the study of a writing system, as the status of these Inca cord records with respect to the question of whether or not they are based on a system of conventionalized sign values—whether semasiographic, phonetic, or of some other, hybridized form—has yet to be clearly and convincingly determined. The challenge of khipu studies is made even more complicated by

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the fact that the Spaniards who conquered the Incas over the course of the first half of the sixteenth century made such extravagant claims about the complexity of the khipu accounts, including that they not only recorded numerical values, but also represented "historical annals."

In this essay, I wish to point to an aspect of what I would term this "khipu quandary" that opens onto a potentially important topic of study in what the editors of this volume have defined as "graphic pluralism." Of all the various types of data our sources claim were recorded in the Inca cord records, numbers—or, more generally, signs for quantitative values—are attested to most positively in the historical records. Beyond their being attested to ethnohistorically, numerical values in a base ten (decimal) system of numeration represent the one feature of cord accounting whose salience we can confirm from our own, present-day study of extant khipu samples (see below). However, here our problem arises: What is the semiotic character and status of the number names and the language of quantitative values the khipu makers used? Did their number terms "mean" the same thing(s) as our own? For instance, did they have concepts of and terms for abstract numbers? If so, would these have mirrored (in semiotic terms) our own? Might the cord keepers have had a different, perhaps heretofore unrecognized way of talking about and giving meaning to numbers and numerical concepts, based perhaps on the unique context in which such terms and grammar emerged—in other words, in the context of knotted cord number signing? The general question, then, is, what did Andean cord keepers *themselves* think about—in other words, what general claims about meaning were they making—when they went about the business of knotting and then "reading" their cord records? Were these officials making in their own interpretations of the numerical cord records—whether in Quechua, Aymara, or some other native Andean language—statements regarding numbers and numerical meanings and values similar to the ones used by sixteenth-century Spaniards and the ones we use in our studies of these devices today? As far as I am aware, we do not have any way of answering these questions with any degree of confidence, as we do not know how "cord readers" in Inca times thought and talked about the knotted cord arrays, other than what Spanish authors say they learned from talking to informants about these matters.

The uncertainty stated at the end of the last paragraph notwithstanding, we can demonstrate with considerable certainty that many khipu cords contain configurations bearing decimal numerical content. On this basis, I argue that we can indeed speak meaningfully about a context of "graphic pluralism" in the early colonial Andes, which took the form of the simultaneous production of number-based texts in knotted cords, on the one

hand, and in written (i.e., Spanish) documents covered with number names and signs (both Roman numerals and Hindu-Arabic number signs), on the other. However, since on the knotted cord side of this equation, we do not have readable, phonetically based signs for number names, how confident can we be that the readings/translations we give of cord configurations have any relevance for how Inca cord keepers thought about and commented on the contents and significance of their cord records? While I will discuss in this essay the condition of graphic pluralism in the colonial Andes based on the conjunction and simultaneous production of Spanish (written) and native Andean (knotted) texts, we must bear in mind that our understanding of the latter is derived from *our* interpretation of *their* cord arrangements by means of *our* linguistic/grammatical/lexical constructions. This leaves us, then, in a decidedly more ambivalent position vis-à-vis the question of the nature of the aboriginal semiotics of the cord records than we obviously would desire. Nonetheless, this is the situation in which students of the khipus find themselves when discussing matters concerning the semiotics of Inca cord accounts.

The Contours of Colonial Andean Numeral Graphic Pluralism

There is perhaps no more striking example of the circumstance of graphic pluralism than that which arose in the Andes in the years following the Spanish conquest of the Inca empire, in 1532. The traumatic events of the conquest and the subsequent half century or so of the formation of a colonial state transformed the lives of people throughout the central Andean region in profound ways. During this period, conflicts and confrontations arose between natives and Europeans due to differences in beliefs, values, and practices with respect to virtually every aspect of life, public and private. One area of difference and conflict between the two societies that has been little studied to date concerned their respective technologies and media for transferring information from memory, experience, and verbal exchanges into a more permanent medium for storage, display, and eventual retrieval. On the Andean side, these tasks were achieved by the use of the *khipu* (Quechua: "knot"), a three-dimensional tactile device of colorful knotted cords made of cotton or camelid fibers. On the Spanish side, information storage took the form of writing in alphanumeric script by scratch-painting marks on flat, two-dimensional surfaces (of paper, hide, etc.). The difference between knotted cords and marks on paper opened a wide chasm between natives and Iberians in the colonial Andes, for not just differences but misunderstandings and misrepresentations emerged across this divide.

For the Jesuit priest and chronicler Bernabé Cobo, writing in the middle of the seventeenth century with the advantage of over a century of Spanish commentaries on native life and culture to draw on, it was precisely Andean people's failure to develop a system of writing that accounted for the absence among these people of everything from rationality to morality and virtually all other forms of civilized behavior. As he noted in his account of Inca religion and customs:

> The most notable aspect of this religion is how they had nothing written down to learn and keep. They made up for this shortcoming by memorizing everything so exactly that it seems as if these things were carved into the Indian's bones. . . . Certainly it would not be possible to ask them for the full rationale for everything because they lacked sufficient insight. They did not even know the grounds on which they relied for their opinions. At the most, they considered the main cause to be the custom of their ancestors . . . [but often] they disagreed on the rationale. . . . This is because they did not have any writings, and thus the rationale and motives of their ancestors were lost" (Cobo 1990 [1653]: 9).

He later adduced the following explanation for why the Incas and their subjects believed such (to him) odd and unbelievable things about their origins: "The reason why these blind people accepted all this was because they never knew about the true God. . . . Another contributing factor was their lack of any kind of writing. If they had had a system of writing, they might not have made such dim-witted errors" (Cobo 1990 [1653]: 17).

We should not, however, fail to balance Cobo's negative view of Andeans with the recognition that the natives themselves did not (at least initially) hold writing and books in such high regard. The signature expression of this view was the Inca Atahualpa's disgust with and tossing aside of the Bible that was handed to him for inspection by the priest Valverde just before the outbreak of hostilities at Cajamarca—although Atahualpa's response may have been based as much on the prior Spanish rejection of a formal invitation to drink *chicha* (corn beer) as on his contempt for the proffered book (see Cummins 2005: 118–20). From the events of Cajamarca, in 1532, through Cobo's mid-seventeenth-century synthesis of earlier writings on the Incas, there transpired a long and contentious history of interactions between natives and Spaniards centering around khipus and books. In this paper, we are concerned with a particular feature—signs of and for numerals—of this confrontation between knot recording and writing in the early colonial Andes.

In the khipu, numerical values were signed by tying knots into cords

to signify values in a decimal-place system of numeration (see Urton 2003). Although colonial Spaniards suggest that khipus also recorded nominal signifiers linked to the numerals, producing noun-adjective constructions such as "10 llamas," we today (as was true of the colonial Spaniards) are unable to read or parse any such nominal signing values, however, they may have been represented (e.g., in colors, construction features, etc.). Therefore, the focus in this article will be on numerical values and number signs, feature(s) of the Spanish-written/Quechua-knotted systems on which we *are* able to comment. On the Andean side, khipus contained three different types of knots tied in tiers along the length of cords in a decimal-place system of signing numerical values. On the Spanish side, we find sheaves of paper containing the squiggled marks signifying either Roman numerals or the number signs and related ligatures of the Hindu-Arabic decimal-place numeral system. How did individuals on either side of this signing divide—knots on string on one side, marks on paper on the other—think about and deal with the other tradition's number signs and numerical values?

As we are concerned with metanarratives relating to and making use of the numerical signs of the "the Other," we must note to begin with that, unfortunately, virtually all reflections on the confrontation between these radically different intellectual traditions and sign systems have come down to us in documents written by Spaniards or by Spanish-trained authors. In addition, the social and political setting we are concerned with was conditioned by conquest and the establishment by Spanish administrators of a host of colonial regulatory institutions (see Rowe 1957). Therefore, there were profound power differences between our two interlocutors, with the Spaniards, initially at least, controlling the local populace. Despite this power differential, the territory where this history transpired was, after all, the homeland of the colonial subjects, a fact that gave the Andeans considerable leverage in this situation. In addition, the information contained in the enigmatic knots of the surviving Inca administrative officials, especially the census data and tribute records, was vital to the Spaniards in their drive to establish an efficient administration that was profitable for the crown.

From the earliest days of colonial rule, especially from the 1540s onward, the Spaniards began systematically transferring khipu data into written documents. This involved calling in the old Inca cord keepers to recount the contents of their khipus. These verbal accounts were translated into Spanish by *lenguas* ("interpreters"); the translations were then transcribed, presumably as faithfully as possible, by scribes into the written record. While researchers have discovered only around fifteen of the documents that were drawn up as transcriptions of khipus, the number is growing, as researchers today have intensified their investigations into this

important documentary material (see especially Pärssinen and Kiviharju 2004).

The Spanish transcriptions of khipus are the nearest things we have to direct accounts of the data and formatting system used by cord keepers in recording data in the preconquest Andean world. By "formatting system," I mean the principles for classifying and prioritizing data. Unfortunately, we have not yet identified a direct match between a khipu and a Spanish transcription of that same cord record. A pairing of a cord account and a written document would represent a resource of unparalleled importance for researchers in our attempts to understand how information was recorded on the khipus. Without the benefit of such a correspondence of accounts, much uncertainty remains in terms of the relationship between the structures observed on extant khipus and the grammatical and syntactical features of the khipu transcriptions. However, it is clear, by virtue of the fact that the khipu transcriptions are products of the translation of cord accounts into Hispanic alphanumeric script and transposed into the written documents according to Renaissance European (Iberian) formatting principles and graphic logic, that the transcriptions cannot be viewed as exact, or faithful renderings of how khipu data were encoded, organized, and/or displayed in cord formatting.

Although the Spanish administrators recognized the importance of translating and transcribing the Inca administrative accounts into written documents, with only a couple of notable exceptions (see La Vega 1966 [1609–17] and La Calancha 1974 [1638]), few Spaniards seem to have had an interest in understanding in a detailed way how the khipus were organized and what kinds of sign values were employed in them. On the other hand, the natives demonstrated considerable interest in learning to manipulate the Spanish alphabetic and numerical signs. As the *mestizo* (part-native, part-Spaniard) Blas Valera noted in the late sixteenth century, "We moreover are slower in understanding their books than they in following ours; for we have been dealing with them for more than seventy years without ever learning the theory and rules of their knots and accounts, whereas they have very soon picked up not only our writing but also our figures [number signs], which is a proof of their great skill" (cited in La Vega 1966 [1609–17]: 331).

How can we explain the difference alluded to in the testimony of Blas Valera? Was it a product of the power asymmetry between natives and Spaniards? Perhaps the colonial subjects reckoned that they had little choice but to adapt to this new recording landscape, and the sooner it was done the better, as it would have profound consequences for their ability to protect themselves and to contest the new colonial administrative bureau-

cracy. Did Andean cord keepers think that writing signs for quantitative data (e.g., census and tribute figures) on paper represented the same thing as tying knots in colorful cords? Is there any indication that Andeans might have reckoned that inscribing numbers on paper was more efficient than, and perhaps even preferable to, tying knots in cords? Finally, is there any reason to think that the newly introduced technology of alphabetic writing influenced native Andean conceptions of the potential utility of the marking of number signs (whether Roman numerals or Hindu-Arabic numerals) on paper, rather than tying knots into cords?

What little attention has been given to date to such questions as those raised above has been directed at the general influence of the introduction of alphabetic writing on khipu record keeping (Rappaport and Cummins 1994, 1998; Mignolo 1995). As I have stressed elsewhere (Urton 1997), almost no attention has been devoted directly to the question of the influence of the introduction of Roman and Hindu-Arabic numerals on native Andean ideas about numbers, quantitative reasoning, and the recording of numerical values. Since we have virtually no native Andean metacommentary on the intellectual challenges of Spanish colonialism (particularly those involving record keeping), where can we turn in order to piece together an understanding of what was at issue in this particular arena of confrontation, at least as far as Andean intellectuals and record keepers were concerned? Perhaps the best available way to proceed is to examine closely how numerical values were signed in the khipus and to consider what implications lie therein for the Andean encounter with European administrative accounting (i.e., political arithmetic), numeration principles, and number signs.

Naming Knots with Numbers

We begin by considering directly what was at issue in the comparison between khipu knotted cords and the written numerals—both Roman and Hindu-Arabic—of the European tradition. The question of how numerical values were signed by khipu knots relates to the numerical interpretation, and its linguistic expression, of constructions such as that shown in figure 1.

Figure 1 shows a single cord pendant from a horizontal cord. In khipu studies parlance, the former is known as a pendant cord, while the latter is termed the primary cord. Beginning at the top of the pendant cord, we see a construction knot for the attachment of the pendant cord to the primary cord, then a space, and then a single knot, followed by another space; next are two knots placed close together and then another space roughly equal to the first; there then appears what is termed a "long knot" composed of four

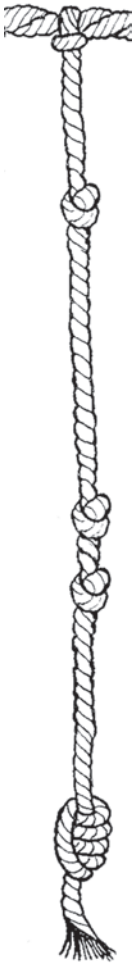

Figure 1. Khipu pendant cord with knots in decimal registry totaling 124. This drawing was made by my wife, Julia Meyerson.

turns of the cord inside the body of the knot; finally, after another space, the cord ends in a "termination knot" (i.e., a knot near the bottom of the cord that secures the spun threads).

Without knowing anything of a possible decimal reading of constructions such as that shown in figure 1, we might render this arrangement by the following, tally-like formulation: (attachment knot) (1) (1+1) (1/sub:

IIII) (termination knot). The penultimate notation of this formula indicates that the penultimate knot on the cord (i.e., the long knot) is subdivided into four parts. There is nothing in the construction in figure 1 that suggests that this configuration must, or should, be interpreted in a numerical fashion (i.e., by a number statement). There is in figure 1 only the offer—which we might (or might not) choose to accept—of tallying the knots to arrive at a sum, as in the following formula: (1) (1+1) (1/sub:IIII) = 4(+sub4).

Now, it took the brilliance and many years of hard work in the American Museum of Natural History, in New York, by L. Leland Locke (1923), an early twentieth-century student of khipus, to recognize that most knot arrangements of the type shown in figure 1 yield consistent readings when interpreted as organized according to a decimal-place system of numeration. Locke found his most important clues in several examples in which several cords have their attachments to the primary cord enlaced by the attachment of an additional cord, which leaves the primary cord in the opposite direction to that of the pendant cords. This single, opposed cord he termed a "top cord." What Locke discovered was that, if one assumes that the knots of pendant and top cords in such khipus are tied in a decimal-place system, the sum of knot values on the top cord is often equal to the sum of the sum of values on all the attached pendant cords. Notably, Locke found that when there is no knot in a place value (i.e., in the place for units, 10s, 100s, etc.), that empty place carried the arithmetic value of "zero." It was only by assuming the existence of zero that, in many cases, the top cord could be shown to record the same value as the combined sums on the attached pendant cords. It was from these studies that Locke discovered that the Incas knew the concept of zero and that they manipulated that (absence of) value in their mathematical system by strategically *not* tying knots in places of value.

Once we accept Locke's demonstration of the decimal-place valuation and organization of khipu knots, we are able to assign to knots the full complement of Hindu-Arabic numerals, from 0 to 9. How did the Quechua, Aymara, and other khipu readers themselves think about and name the knot configurations on their cords? Were these knot configurations, especially the ten that made up the building blocks of decimal numeration (i.e., 0–9), perceived by the Inca cord keepers as Hindu-Arabic-like numeral *signs*? And, in relation to our interest in graphic pluralism in the colonial Andes, after they were exposed to written accounting documents, did the cord keepers think they were doing the same thing by knotting numerical values in the khipus as the Spaniards were doing when the latter put quill to paper and produced such arrangements of graph-based signs as that shown in figure 2?

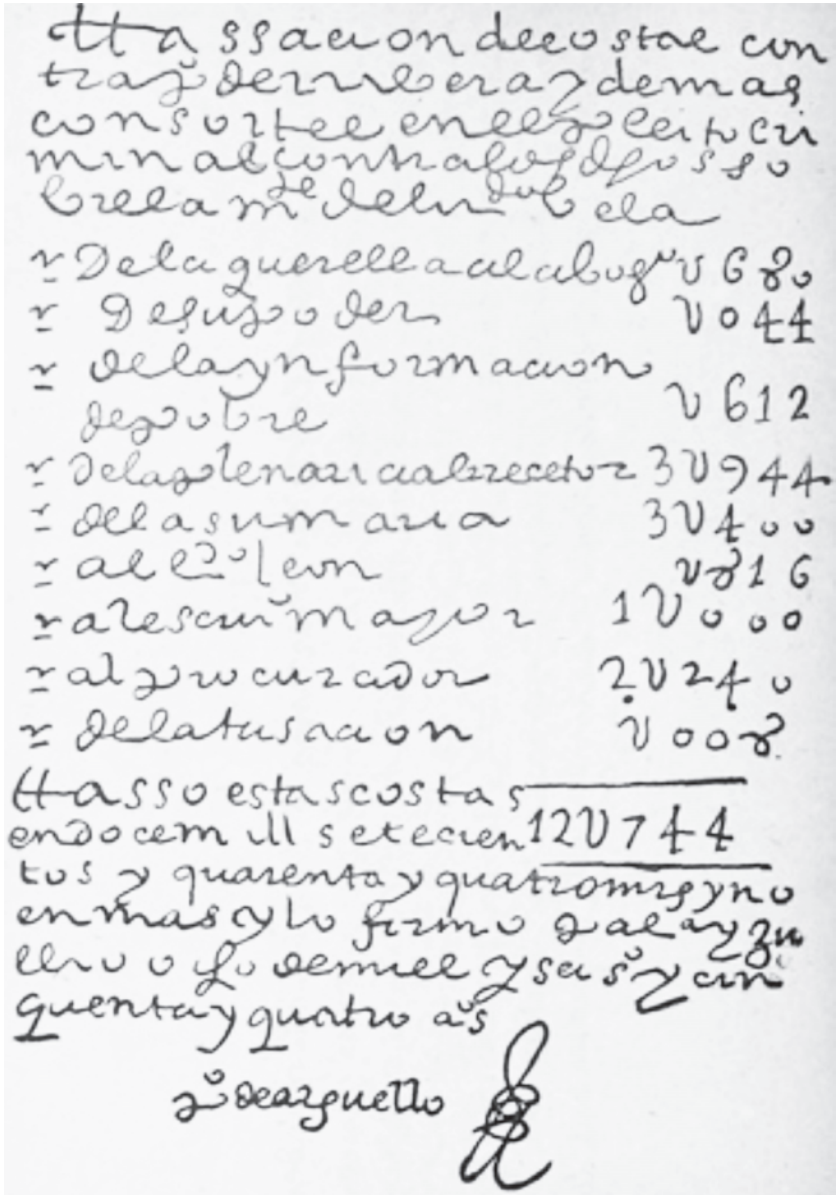

Figure 2. Sixteenth-century Spanish accounting document. Source: Muñóz y Rivero 1889

Another way to get at the basic question we are raising here is to ask: Did the Incas, in fact, have signs for numbers? That is, did they have signs for numerical quantities that could be applied in an abstract way, such that they did not need concrete referents? Was a particular configuration of knots on a string (as in figure 1, in which the knots sum to 124) a sign for the name of the quantity that was the sum of that group of knots? Is there any reason for us to interpret the numerical values recorded on khipus as in any way more indicative of the existence of Hindu-Arabic-like abstract numbers than representations of numerical values in any other given context in Inca society? I think we can answer this question in the affirmative. The following example may help clarify my point here. Consider two collections of objects, the first of which is a cord bearing two knots in the 10s place and a long knot of three turns in the units position. In the Lockean/decimal reading, such a cord holds the sum "23." Note, however, that there are not twenty-three objects on the cord; rather, there are only three objects: two small knots and one long knot of three turns. Now, for the next collection, make three piles of stones; place ten stones in the first pile, ten stones in the second, and three stones in the third. There are now twenty-three stones in the three piles. We could name the sum of the three piles of stones "23." There is an equivalence between the number of stones in the three piles and the name of the sum we apply to it. However, as we saw, this was not the case with the knotted cord containing our first collection, although we used the same number name—"23"—to refer to that numerical value. Therefore, it appears that the knotted cord relies on an abstract number concept and that, therefore, *this* collection (of two small knots and a longer one of three turns) may represent an abstract number sign for this quantity (twenty-three) that could apply to any number of objects.

Would an Inca khipu keeper, viewing numerical ciphers like those shown scratched on paper in figure 2, have considered that those marks represented the same kinds of things as the knots and arrangements of his knotted cords? Unfortunately, we will never know what was in the heads of those individuals who were responsible for recording and reading the khipu accounts, either in pre-Hispanic or colonial times, in terms of their conceptions of numbers or in their lexicons and grammatical formulations in performing the mathematical calculations from which the recorded data were derived.

Contexts for the Joint Performance of Signing and Reading Numbers

Another point to consider: when, and under what circumstances, would Andean people, whether former *khipukamayuqs*/administrators or com-

moners, have found themselves in a setting in which colonial authorities would have actually engaged in the activity of writing number signs, or performing arithmetic calculations? Perhaps such activities went on largely out of sight of local people, in which case there would have been few occasions for Andeans to witness the new and radically different technology of writing ciphers on paper, as opposed to tying knots in cords. In fact, such occasions would not have been infrequent in the early colony, as colonial officials appear to have spent a goodly amount of time coming and going around the countryside engaged in administrative activities such as drawing up documents pertaining to *visitas* and *revisitas* (see below). These administrative activities were intimately concerned with public performances of political arithmetic—for example, tables were set up for scribes to write on; sheaves of paper were rustled; quills were flourished; and numbers and names were scratched (painted) on paper. These were important components of the display of power by colonial administrators, and as such, they constituted essential elements of the technology of rule in the colony. Let us examine now a few specific contexts in which Andean natives would have witnessed the writing of number signs in alphanumeric script.

The *visita* ("visitation") process was a vital function in colonial administration. The term referred to serial visitations by a colonial official—the *visitador* ("visitor")—to a local community, or a group of communities, for the purpose of taking a census of the local population(s). The visitors were usually accompanied by the local *encomendero* (the Spanish official with formal responsibility over/for the Indians in question), a scribe (*escribano*), a cook, and other attendants, as well as native officials, especially the local headman, the *kuraka* (also known as *cacique*). Censuses were the prelude to the calculation and eventual imposition of tribute on local communities, the nature and amount of which was determined, to a large degree, on the basis of the census count.

As Armando Guevara-Gil and Frank Salomon have explained with admirable clarity (1994: 10–12), there were basically two forms such visits took. In one form, the visitador and his entourage processed from house site to house site, enumerating the residents and inscribing their data—name, status (e.g., head of household/tribute payer, wife, son or daughter, etc.), and often age—in a document, also called a *visita*. The second form in which these censuses were conducted was by summoning all residents of the town to a central place, such as a plaza. Upon gathering at the designated place and being nudged into lines and groupings according to the coordinates of the local social cosmos, the different family groups came one-by-one before the visitador, the scribe noting down the names, statuses, and ages of the family members. In either form, the visita procedure represented one impor-

tant context in which local people would have come into direct contact with scribes writing documents with the markings of alphanumeric script. These would have been fraught, highly charged settings, as the import for the local political economy of the scribal scratchings of letters and ciphers on paper would not have been lost on anyone involved in the visitation procedures.

I have said that there was at least one local official in attendance at visita performances—the local lord, or kuraka. In fact, in many instances, the kurakas were joined by one or more khipu keepers who attended the proceedings, wielding their cord records. The native record keepers were important figures in these processes, because, as the Spaniards learned early on, cord data often included older census records, which could serve as both source and check on the data collected by the visitador and recorded by the scribe. Thus, in this setting, the scribe—the maker of marks of letters and numbers—stood side by side with the reader of knots—the khipu keeper. This was the setting, then, for close encounters between the records and record makers/readers of the two colonial traditions of number registry discussed earlier in this paper.

In sum, the visita was one of the principal settings for action and mutual reflection on these radically different number-recording traditions by the two relevant officials. Unfortunately, but perhaps not surprisingly (as these officials were engaged in the serious business of accounting), there are virtually no documentary records containing reflections by one or the other of the parties to these procedures concerning the differences in the technologies of recording in use. At most, scribes note that the khipu keeper held a bundle of cords in his hands, from which he reported the census data registered on the khipu.[1] We of course have no accounts of what the native record keepers observed or thought about during these encounters. A few extracts from published visita accounts will give the flavor of the descriptions of these graphic pluralistic encounters, at least as they are described by the Spanish scribes.

> *Pueblo de Atcor*: Después de haber hecho la visita de los dichos cinco pueblos el dicho señor Iñigo Ortiz [the visitador] fue al pueblo de Atcor de la pachacade los queros y en ella se halló por principal un indio que se llama Martín Rume de treinta y cinco años el cual dio cuenta por quipo de los indios que en él hay de lo demás. (Ortiz de Zuñiga 1967 [1562]: 191)
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> [*Town of Atcor*: After having made the visitation of the said five towns, the said lord/Señor Iñigo Ortiz went to the town of Atcor of the *pachaca* ["one-hundred"] of the Queros people and there he found as the headman an Indian who was named Martín Tume, who was thirty-

five years old and who gave an accounting by khipu of the Indians that there were in that town.]

Quipo que dieron los caciques del número de indios que había en tiempo del ynga: Testigo en el dicho pueblo de Chucuito veinte y tres días del mes de febrero del dicho año de mil y quinientos y sesenta y siete años ante el dicho señor Garci Diez de San Miguel visitador de esta provincia por ante mí Francisco López escribano de la dicha visita pareció don Martín Cari cacique principal de la parcialidad de Anansaya y trujo consigo unos hilos de lana con unos nudos en ellos que dijo ser su quipo y cuenta de los indios tributarios que en tiempo del ynga había en esta provincia de Chucuito y que el dicho quipo es el ultimo que se hizo en tiempo del ynga y luego mirando por el dicho quipo y cuenta el cual juró en forma de derecho ser cierto y verdadero hizo la declaración siguiente. (Diez de San Miguel 1964 [1567]: 64)

[*The khipu that gives the caciques the number of Indians there were in the time of the Inca*: As witness in the said town of Chucuito on the 23rd day of the month of February in the said year of 1567 before the said Sr. Garci Diez de San Miguel, Visitor of this province and before me, Francisco López, scribe of the said Visit, there appeared don Martín Cari, cacique principal [head local authority] of the sector of Anansaya [the Upper Part] and he brought with him some threads of wool with some knots in them which he said were his khipu and account of the tributary Indians that there were in the province of Chucuito in the time of the Inca, and then looking at the said khipu and accounting he swore to testify truthfully and with certainty, making the following declaration.]

Clearly, in such dry, reportorial testimony there is not much reflective content. In fact, virtually all accounts of Andean record keepers at work on their job of accounting are exceedingly descriptive in content. It is undoubtedly the case that as experts from the two traditions manipulated their respective paraphernalia and signs there would have been moments of reflection on the similarities and differences, as well as on the possibilities of the transfer and translation of information (if not techniques) between the two; however, with no explicit testimony, speculation on these matters ultimately is not very useful. In light of this, we must turn our attention elsewhere in an effort to find an echo, or a hint of the significance of this clash of epistemologies and technological traditions. I therefore turn to two pieces of evidence evincing what appear to be clever and potentially introspective plays on the forms and consequences of confrontations, interactions, and possible claims of (even vague) similarities between the two

traditions. These examples involve appropriations of the signs of Hindu-Arabic numerals and/or alphabetic characters produced by individuals familiar with both Andean and European technologies and intellectual traditions of record keeping, numeration, and accounting. The two examples we will examine derive from works produced near the end of the sixteenth century, almost a half century after the events of Cajamarca.

Poma de Ayala's Appropriation of Numeral Signs

Felipe Guaman Poma de Ayala was an Andean native, a man from the province of Lucanas, in southern Peru, who spent years participating in the colonial project of ferreting out native "idolatries." In this work, he served as assistant to the ecclesiastical visitor, Cristóbal de Albornoz; later, he became an assistant to the Mercedarian friar Martín de Murúa (Adorno 1986, 2008). Following his long involvement, especially with Murúa, Poma de Ayala turned decisively against the colonists as he became increasingly disturbed by the destructive processes first of the conquest and then, over the longer term, of the establishment of the colony. Poma therefore undertook to write a letter of protest to the king of Spain, Phillip III (Guaman Poma de Ayala, 1980 [1615]). Guaman Poma's letter, an astonishing 1,190 pages long, includes 398 pages of drawings illustrating life in the Andes before, during, and after the Spanish conquest. Both the text and the drawings are extraordinarily rich sources of information drawn from Guaman Poma's memories and experiences as he had witnessed the colonial transformation of the Andes. What I will focus on here are a few notable and intriguing instances of Guaman Poma's incorporation into depictions of Inca material cultural objects of the European-introduced number signs, the Hindu-Arabic numerals.[2] As we will see below (and as Adorno has already argued so eloquently in 1986), in his efforts to communicate his arguments to his intended audience, the king of Spain, Guaman Poma was a master of the subtle manipulation of signs and symbols.

In the first place, we should note that Guaman Poma includes khipu handlers in about a half-dozen drawings. In most cases, the khipus held by these officials are depicted as plain, unknotted thin cords, as in the drawing of a provincial governor who holds one khipu rolled up, in his right hand, and another opened sample in his left hand (fig. 3). However, in one case, that of a khipu keeper stationed at a storage depot (*collca*—"storehouse"), the khipu appears to contain knots (fig. 4). As Cummins has noted (1997: 245), there is in the drawings of khipus by Guaman Poma no attempt to instruct the viewer in the esoteric details of knot recording and reading. Rather, Guaman Poma displays khipus in various settings relating to

Figure 3. Inca provincial administrator/khipu keeper. Source: Guaman Poma de Ayala 1980 [1615]: 320 [348]

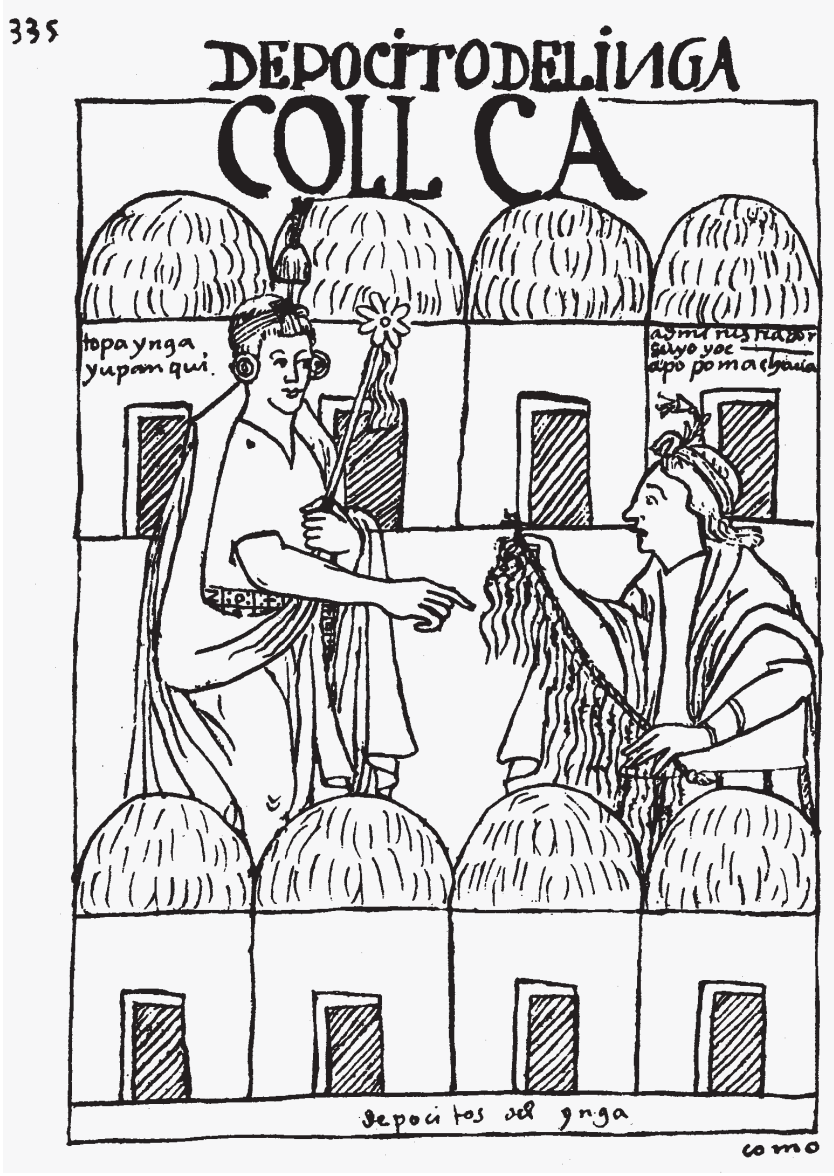

Figure 4. Khipu keeper of the royal storehouse (*collca*) reporting to supervisor. Source: Guaman Poma de Ayala 1980 [1615]: 309 [335]

accounting and record keeping, but—either because he did not know how to manipulate khipus or because he was not inclined to share this esoteric knowledge with his viewer—he was intent only on purveying the general message that the Incas possessed a device for communication and record keeping. So much for Guaman Poma's depiction of khipus, but what of his interest in European number signs? We will see below that he uses those—especially Hindu-Arabic numerals—liberally and to interesting symbolic effect.

In the later, postconquest section of his chronicle, Poma illustrates a wealth of objects and actions typifying life in the Andean colony. In one drawing, he depicts an elaborate sundial displaying numerals arranged in the standard manner—with 6 on either end, to mark sunrise and sunset, and 12 noon in the center (fig. 5). This illustration depicts, in a direct and economical context, how Guaman Poma rendered all ten of the Hindu-Arabic numerals—from 0 to 9. This is instructive as we can compare his renderings of the number signs in this clearly numerical context with other renderings, especially ones in which Poma's intentionality might be subject to some question.

As an instance of the latter, I turn to a set of three drawings in which Guaman Poma depicts three Inca kings wearing ceremonial shirts, called *unkus*. In the "field" of signs on this set of ceremonial shirts, Poma replaces the typical geometrical designs of the *tocapus* (see below) with Hindu-Arabic numerals (fig. 6); most clearly depicted are versions (precisely as depicted on the face of the sundial) of the numerals 3, 4, 8, and possibly 2 (e.g., upper left-hand figure, central column).

The comparison between the signs ornamenting the Incas' unkus in figure 6 and the numeral signs on the sundial in figure 5 provides an interesting case study in Andean graphic pluralism. *Tocapus* were complex geometric designs adorning textiles, ceramics, and other materials. In Guaman Poma's drawings, such figures appear in the place of what were the finely worked tapestry squares adorning such royal unkus. Tocapus have been interpreted as elements signifying rank and status in the Inca political hierarchy (Zuidema 1991). Cummins (2005: 90–91) has argued that these design elements did not carry explicit meanings in and of themselves; rather, their meaning and significance emerged in and through the context within which they were used (e.g., on drinking vessels, unkus, etc.). The question for us here is, What was Guaman Poma's objective in rendering some of the tocapus on unkus as Hindu-Arabic numerals?

As I have suggested in an earlier approach to this problem (Urton 1997: 201–7), I think that Guaman Poma's intention was to present his intended viewer (the king) with a claim concerning the similarity between the signifying capacities and intentions of the Andean/Inca tocapu sign system

Figure 5. Indian with sundial inscribed with Hindu-Arabic numerals. Source: Guaman Poma de Ayala 1980 [1615]: 799 [853]

Figure 6. Inca kings wearing *unkus* (royal shirts) with some *tucapus* (patterns) rendered as Hindu-Arabic numerals. Source: Guaman Poma de Ayala 1980: 84 [104]; 86 [106]; 90 [110]

and European numerals. I suggest that Guaman Poma is here constructing an argument by metaphorical substitution to the effect that the Incas had developed a system of signs (the tocapus) that was equally effective and powerful in its capacity to segregate, order, and rank different identities to the system of signs whereby these functions were performed in Spanish colonial administration—the Hindu-Arabic numerals. Through his imagery combining Andean graphic elements (the tocapus) with European numerals, Guaman Poma was arguing that the Incas had achieved with the tocapus as effective a tool of control and regulation as the Europeans had with

their number- and mathematics-based colonial administrative accounting (Cf. Urton 2009). This suggests, in turn, that Guaman Poma himself was impressed with the power of the European accounting and mathematical traditions, a power whose force, as realized in Western colonial administrations, has been characterized by Alan Bishop as follows: "Using numbers and measurements in trade, industry, commerce and administration would all have emphasized the power and control values of mathematics. It was (and still is) so clearly useful knowledge, powerful knowledge, and it seduced the majority of peoples who came into contact with it" (Bishop 1990: 58).

Color Coding and Knotting in a Khipu in the Chronicle of Murúa

I noted above that in his earlier career, Guaman Poma had served as an assistant to the Mercedarian Martín de Murúa, a person whom the native Andean later came to despise (Adorno 1986: 55). Murúa himself produced two different versions of a chronicle on the Incas, the earliest of which was produced between 1590 and 1609, while the later text was produced between 1611 and 1616 (Ossio 2004, 2008). Murúa began work on these manuscripts, which also contain numerous illustrations, in the late 1580s, several years before Guaman Poma began his own "letter to the king." The curious circumstance that complicates these literary histories is that Guaman Poma was one of possibly three artists who produced drawings for the Murúa manuscript(s). In certain cases, it is clear (from similarities in drawing style) that certain of Murúa's drawings were executed by Guaman Poma. Murúa and possibly a third artist produced the drawings not executed by Guaman Poma (Ossio 2004: 24). I will examine below one of Murúa's drawings—one of two depictions in Murúa's earlier (known as the Galvin) manuscript of khipukamayuqs displaying khipu (fig. 7).

The khipu held in the hands of the khipukamayuq in figure 7 has its cords shown as relatively flat, linear shapes. This is unlike the manner of drawing khipu cords in Guaman Poma's own illustrations, in which he depicts the strings as narrow lines. As the khipu in the Murúa illustration is drawn differently from the various illustrations of these devices in Guaman Poma's chronicle, it seems likely that the khipu in the hands of the Inca record keeper in figure 7 was drawn by Murúa, or some other artist, but not by Guaman Poma. What is interesting to note with respect to this khipu, particularly in comparison to those shown in Guaman Poma's drawing, is the information this Murúa khipu sample displays. The information consists of colors and markings.

Figure 7. "Khipu keeper accountant" holding colorful khipu (Murúa 2004 [1590]: 76v)

As for color, the cords of this khipu appear in a profusion of hues: medium brown, blue, light brown, red, and yellow (fig. 8). There is no apparent regular sequencing of these colors, which leads me to conclude that the artist is not making any particular claim about the patterning of colors in these khipu cords; rather, the message seems to be, generally, that color was a signifying feature of cords. Secondly, when we look closely at this khipu drawing (see esp. fig. 8), we see that each string/pendant cord of the Murúa khipu bears two squiggles, which look like *S*s, or 5s.[3]

What did the artist who drew the Murúa khipu mean to communicate by the pairs of markings placed on each cord? Were these squiggles mere stylized renderings of khipu knots? Or was the intention here to comment on—that is, to make some claim by metaphorical substitution—of a relationship between khipu knots and alphanumeric signs? Should we give any significance to the fact that the artist included an identical pair of these markings on each cord of the khipu? I do not think we can answer these questions definitively, given the information available to us. Whatever the artist's intention, we are confronted in this image with an instance of a figural exploration along the boundary between khipu signification and the signing units of European writing.

I suspect that what is at issue in the renderings of khipus in the illustrated chronicles of both Guaman Poma and Murúa is that the khipu was an esoteric object of communication whose manipulation was restricted to a limited body of administrative officials in the Inca empire. While both Guaman Poma and Murúa (or whoever was the artist of the sample in the Murúa drawing) were interested in, and wished to promote the significance of, these devices to their European readers/viewers, neither was intimately familiar with the subtleties of cord keeping (neither author makes such a claim, in fact). Here, we seem to be confronted by individuals who wish to extol the khipu, in general terms, as a complex device for communication, but who are themselves unfamiliar with the intricacies of cord communication to the point that they might have been able to explicate the arts of cord keeping and reading in explicit terms. We seem to be confronted here by colonial Andean examples of a project of displaying imagery connected with a complex instrument and technology of recording but in which the one presenting the model is either unfamiliar with the details and the esoteric knowledge of the device in question or chooses not to divulge that detail and knowledge. In fact, there is a resonance here of Claude Lévi-Strauss's (1961) famous "writing lesson," which is set elsewhere in South America at a much later time.

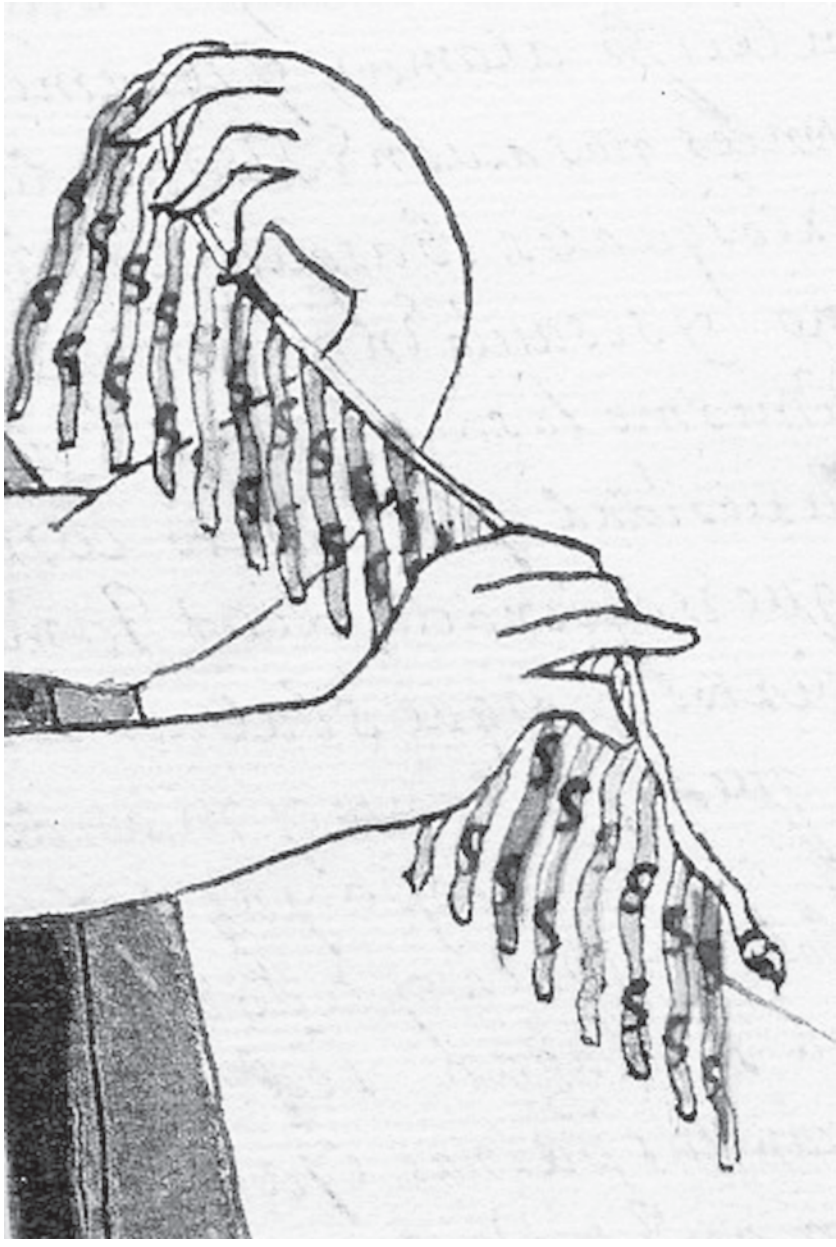

Figure 8. Close-up of khipu held by khipu keeper in figure 7, showing "S/5" (?) inscriptions on pendant cords

A "Writing Lesson" for the Andes

When Frank Salomon and Sabine Hyland first contacted me about participating in the American Society for Ethnohistory symposium on graphic pluralism, an anecdote flashed through my mind that seemed to me then (and still today) singularly apt for thinking about this topic from a South American point of view. The anecdote concerned Lévi-Strauss's brief discursus on writing, representation, and power in his classic work, *Tristes Tropiques* (or, by its English title, *A World on the Wane*, 1961). The story, as told in the chapter entitled "A Writing Lesson" (286–97), involved a Nambikwara chief, in the western Mato Grosso of central Brazil, with whom Lévi-Strauss had become well acquainted. As he had done elsewhere in his travels in the Mato Grosso, Lévi-Strauss distributed pencils and paper to the Nambikwara band and invited them to make drawings. In addition to the fact (as he notes) that "it goes without saying" that the Nambikwara could not write, Lévi-Strauss was struck that the men of the band seemed at first unable even to draw. One day, however, he found a group of men engaged in drawing wavy horizontal lines, in imitation (he concluded) of his writing. The situation became decidedly more complex and interesting when, a few days later, in the context of an exchange of gifts between neighboring bands, Lévi-Strauss was surprised when the Nambikwara chief stood up, drew from his basket a piece of paper covered with squiggled lines, and proceeded—for two hours!—to "read" from the list what the chief considered to be the appropriate exchanges between the two groups. In his commentary on the chief's "writing and reading," Lévi-Strauss asks: "What was he hoping for? To deceive himself, perhaps: but, even more, to amaze his companions and persuade them that *his* intermediacy was responsible for the exchanges. He had allied himself with the white man, as equal with equal, and could now share in his secrets" (289; emphasis in original).

This episode led Lévi-Strauss to ruminate on the political significance of writing or of what was, in this case, a representation of control over the means of writing. In his interpretation of what had gone on in this incident, Lévi-Strauss concluded that writing has always and everywhere been associated with the formation of cities and empires, with political integration, and with the emergence of hierarchies of classes and castes. In short, he claims, writing favors the exploitation, rather than the enlightenment, of mankind. He concludes: "If my hypothesis is correct, the primary function of writing, as a means of communication, is to facilitate the enslavement of other human beings. The use of writing for disinterested ends, and with a view to satisfactions of the mind . . . is a secondary result of the invention—and may even be no more than a way of reinforcing, justifying, or dissimulating its primary function" (Lévi-Strauss 1961: 292).

What is the relevance of this anecdote, and of Lévi-Strauss's rumination from the Mato Grosso in the mid-twentieth century, for the material discussed in this paper? It seems to me that we can take away two important messages from Lévi-Strauss's "writing lesson." One message draws directly from Lévi-Strauss's own conclusion to the effect that writing "facilitates the enslavement of other human beings." The second concerns a more subtle message concerning the significance of the *representation* of a claim of control over the means of communication. As for the first message, the question arises of the degree to which Lévi-Strauss's conclusion on the power of writing applies to the role of khipu record keeping in the Inca empire, on the one hand, and to *writing* about khipu record keeping (as Murúa and Guaman Poma did) in the Andean colony, on the other. In both cases—and I am assuming in this that the khipu represented if not true (phonetic-based) writing, then certainly a complex system of record keeping based on conventionalized sign values—I think we see clear evidence that "noting down" (in knots or letters) information, storing those notations in an archive, and then manipulating the (respective) text(s) in ways and in settings that display control over the subject matter contained in those records constitute in both settings instances showing how writing and record keeping are implicated in the formation and maintenance of relations of control and domination.

The second message concerns the representation of claims of control over the means of communication. In this, I am pointing to the political significance of Murúa's and Guaman Poma's drawings of khipu keepers, as well as to Guaman Poma's manipulation of Hindu-Arabic numerals in his drawings of the unku-clad Inca kings. In their representations of khipu keepers wielding their knotted cords, neither Murúa nor Guaman Poma were intent on exposing to the viewer the esoteric details of the Inca art of cord keeping (nor do their respective texts contain such information). Rather, the images of khipu keepers serve the purposes of, first, displaying to the viewer a spectacle of Inca accountants efficiently going about the business of recording and displaying information concerning state business, and second controlling the reader's access to the imagery of these Inca record keepers. But note: in this second message, neither Murúa nor Guaman Poma displayed an intimate knowledge of khipu record keeping, as neither appears to have been privy to that esoteric knowledge. In this, our two chroniclers stood to the knowledge of khipu keeping just as Lévi-Strauss's Nambikwara chief stood to writing. All three—Murúa, Guaman Poma, and the Nambikwara chief—were engaged in the production of representations of recording/writing as sources of authority and power in the particular contexts within which these "authors" were operating.

I argue, finally, that the conclusion arrived at above is precisely what

Guaman Poma was doing in his appropriation of Hindu-Arabic numerals as tocapu signs. He was arguing, on the one hand, for the complexity of Inca sign behavior by means of tocapus (i.e., by comparing them to European numerals), and, on the other hand, he was displaying his own mastery of both sets of signs as a basis for arguing for his own authority and power as a purveyor of information about the Incas. In short, it appears that the products of graphic pluralism are never what they appear to be on the surface!

Conclusion

As I hope to have shown to some degree herein, an examination of the forms and processes of graphic pluralism represents a highly useful and stimulating approach to exploring the meanings and intentions of a variety of actors and participants in the Andes in the 1500s and 1600s as they were engaged in this confrontation between two ancient systems of sign production—one Andean, the other Iberian/western European. As individuals and groups throughout the Andes were caught up in complex ways in the web of European contact and colonization, one of the areas of production in which, first, recognition, and later, some attempt at resolution, of the differences between the systems arose as one of the challenges facing administrators and intellectuals from the two traditions. What we have seen here have been faint hints of the ongoing confrontation between semiotic traditions that occurred on the front lines of these colonial encounters. Although the particular content and contexts of the stage on which we have examined this confrontation—the interaction between accountants and administrators—has been of little interest to historians in the past, it is clear that this was a crucial arena of contact. Attention to this theater of contact and interaction brings to light important elements of what was an inexorable process of hybridization unleashed by the new globalizing, transcultural forces of European colonization.

Notes

Many thanks to Frank Salomon and Sabine Hyland for their kind invitation to me to participate in their symposium on graphic pluralism at the American Society for Ethnohistory meeting in Tulsa, Oklahoma, in November 2007. I express my great appreciation to Julia Meyerson and Carrie Brezine for reading and commenting on earlier drafts of this paper. I alone am responsible for any errors or moments of faulty judgment or reasoning that remain in the paper.

1 In all cases that I am aware of, at least in the early sources, khipu keepers are identified as male (but see Salomon's [2004: 122–25] account of what was apparently one female cord reader, in eighteenth-century Peru). Female khipu keepers likely

were common in preconquest times; however, just as what appears to have been an entire, parallel hierarchy of female political officials (e.g., female equivalents of *kurakas*) seems to have been systematically disregarded by Spanish administrators (Silverblatt 1987), the same lack of attention from the almost exclusively male colonial officials might explain why we hear nothing of female khipu keepers.

2 As far as I have been able to determine from a fairly systematic review of Guaman Poma's text and drawings, he does not at any point use Roman numerals. That is, in all instances when Guaman Poma writes European signs for numbers, he employs Hindu-Arabic numerals.

3 From a close examination of Murúa's text and other drawings, it appears that the letter *S* is executed in a manner almost identical to the writing of the numeral 5 and both are almost identical to the elements inscribed on the khipu cords in figure 8. It is likely, however, that Murúa is here simply executing "squiggles" (with no intention of inscribing letters or numbers) to signify the presence of knots.

References

Adorno, Rolena
1986 *Guaman Poma: Writing and Resistance in Colonial Peru*. Austin: University of Texas Press.
2008 Guaman Poma de Ayala, Felipe (ca. 1535–ca. 1616). In *Guide to Documentary Sources for Andean Studies, 1530–1900*. Vol. 2. Joanne Pillsbury, ed. Pp. 255–68. Norman: University of Oklahoma Press.

Bishop, Alan J.
1990 Western Mathematics: The Secret Weapon of Cultural Imperialism. *Race and Class* 32, no. 2: 51–65.

Cobo, Bernabé
1990 [1653] *Inca Religion and Customs*. R. Hamilton, trans. Austin: University of Texas Press.

Cummins, T. B. F.
1997 Images on Objects: The Object of Imagery in Colonial Native Peru as Seen through Guaman Poma's *Nueva corónica i buen gobierno*. *Journal of the Steward Anthropological Society* 25(1 and 2): 237–76.
2005 *Toasts with the Inca: Andean Abstraction and Colonial Images on Quero Vessels*. Ann Arbor: University of Michigan Press.

Diez de San Miguel, G.
1964 [1567] *Visita hecha a la Provincia de Chucuito*. Lima: Ediciones de la Casa de la Cultura del Perú.

Guaman Poma de Ayala, Felipe
1980 [1615] *El primer nueva corónica y buen gobierno*. John V. Murra and Rolena Adorno eds. J. L. Urioste, trans. 3 vols. Mexico City: Siglo Veintiuno.

Guevara-Gil, Armando, and Frank Salomon
1994 A 'Personal Visit': Colonial Political Ritual and the Making of Indians in the Andes. *Colonial Latin American Review* 3, no. 1–2: 3–36.

La Calancha, Antonio de
1974 [1638] *Crónica moralizada del orden de San Agustín en el Perú con sucesos ejemplares en esta monarquía*. 6 vols. Lima: Universidad Nacional Mayor de San Marcos.

La Vega, E. I. Garcilaso de
1966 [1609–17] *Royal Commentaries of the Incas*. H. V. Livermore, trans. 2 vols. Austin: University of Texas Press.
Lévi-Strauss, Claude
1961 *A World on the Wane*. J. Russell, trans. New York: Criterion Books.
Locke, L. Leland
1923 *The Ancient Quipu or Peruvian Knot Record*. New York: American Museum of Natural History.
Mignolo, W. D.
1995 *The Darker Side of the Renaissance: Literacy, Territoriality, and Colonization*. Ann Arbor: University of Michigan Press.
Muñóz y Rivero, Jesús
1889 *Manual de paleografía diplomática española de los siglos XII al XVII*. Madrid: Librería de la Sra. Viuda de Hernando y Compañía.
Murúa, Martin de
2004 [1590] *Códice Murúa—Historia y genealogía de los reyes Incas del Perú del Padre Mercenario Fray Martín de Murúa (Códice Galvin)*. Madrid: Testimonio Compañía Editorial, S.A.
Ortiz de Zúñiga, I.
1967 [1562] *Visita de la provincia de Leo de Huanuco en 1562*. Documentos para la Historia y Etnología de Huánuco y la Selva Central. 2 vols. Huánuco, Peru: Universidad Nacional Hermilio Valdizan.
Ossio, J. M.
2004 Introduction. In Murúa, *Códice Murúa*. Pp. 7–72.
2008 Murúa, Martín de (?–ca. 1620). In *Guide to Documentary Sources for Andean Studies, 1530–1900*. Vol. 3. Joanne Pillsbury, ed. Pp. 436–41.
Pärssinen, Martti, and Jukka Kiviharju, eds.
2004 *Textos Andinos: Corpus de textos khipu incaicos y coloniales*. Vol. 1. Madrid: Instituto Iberoamericano de Finlandia and Universidad Complutense de Madrid.
Rappaport, J., and T. Cummins
1994 Literacy and Power in Colonial Latin America. In *Social Construction of the Past: Representation as Power*. G. C. Bond and A. Gilliam, eds. Pp. 89–109. New York: Routledge.
1998 Between Images and Writing: The Ritual of the King's *Quillca*. *Colonial Latin American Review* 7, no. 1: 7–32.
Rowe, J. H.
1957 The Incas under Spanish Colonial Institutions. *Hispanic American Historical Review* 37: 155–99.
Salomon, Frank
2004 *The Cord Keepers: Khipus and Cultural Life in a Peruvian Village*. Durham, NC: Duke University Press.
Silverblatt, I.
1987 *Moon, Sun, and Witches: Gender Ideologies and Class in Inca and Colonial Peru*. Princeton, NJ: Princeton University Press.
Urton, Gary
1997 *The Social Life of Numbers: A Quechua Ontology of Numbers and Philosophy of Arithmetic*. Austin: University of Texas Press, Austin.
2003 *Signs of the Inka Khipu: Binary Coding in the Andean Knotted-String Records*. Austin: University of Texas Press.

2009 Mathematics and Authority: A Case Study in Old and New World Accounting. In *The Oxford Handbook of the History of Mathematics*. E. Robson and J. Stedall, eds. Pp. 27–56. Oxford: Oxford University Press.

Zuidema, R. T.

1991 Guaman Poma and the Art of Empire: Toward an Iconography of Inca Royal Dress. In *Transatlantic Encounters: Europeans and Andeans in the Sixteenth Century*. K. J. Andrien and Rolena Adorno, eds. Pp. 151–202. Berkeley: University of California Press.