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Quipu

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The quipu is most commonly known as the numeric recording system of the Inca Empire which extended across Peru and parts of Chile, Argentina, Ecuador, Bolivia, and Colombia during the fifteenth and sixteenth centuries. This device is the result of a long tradition of Andean textile production and string patterns in pre-Inca civilizations and its use extended well into the colonial period (and is still used to some extent in various present-day communities). Over the years, these knot records have been interpreted as mnemonic devices, numeric accounts, narrative histories, binary codes, and various classifications of writing systems.

Colonial chroniclers described their awe and inability to perceive how the Incas manipulated the colored cords with such ease, to denote both numerical and historical information related to the tribute of goods and money, labor obligations, censuses, laws, past leaders, and deposits. The Jesuit missionary José de Acosta writes,

"They are quipus, memorials or events registered in strings, on which diverse knots and diverse colors, meant different things. It's incredible what they achieved this way, how much books can say about history, and laws, and ceremonies, and business accounts. The quipus supply all this so promptly that it's admirable. In order to have these quipus or memorials there were official representatives that today are called *quipocamayo*, who were obligated to give accounts of everything, like the public scribes here, and as such they have to be given full credit. For diverse genres like war, government, tribute, ceremony, land, there were diverse quipus or strings. And in each handling of these, so many knots and intricacies, and strings were attached. Some were colored, some green, some blue, others white, and so many differences, that just as we form 24 letters in different ways and make such an infinity of words, these knots and colors make innumerable meanings of things" (VI. c. viii. 2008, p. 210 my translation)

Colonial accounts such as this one, however, cannot be taken as verbatim descriptions of Inca accounting as this practice and the very nature of quipus were greatly transformed after Spanish intervention (Curatola Petrocchi & de la Puente Luna, 2013). To my knowledge there are ten known images of quipu from the colonial period, seven from the *Nueva corónica y buen gobierno*, two from the *Historia General del Piru* (*Galvin Manuscript*), and one from the *Historia General del Piru* (*Getty Manuscript*) (Figs. 1 and 2). These visual sources provide additional clues regarding the system, including the connection between quipu records and the Spanish letter: *carta*, the Inca messengers; *chasquis*, the Inca deposits; *collca*, the Inca abacus; *yupana*, astronomy, the Spanish book; and more.

On a descriptive level, the quipu is a system of cords and knots in which information is conveyed through the varied use of knot patterns, materials, and structural indicators (Fig. 3). In its most basic and common form, the quipu is composed of a thicker primary cord from which pendant cords are attached in a downward direction and top cords extend upwards, sometimes even uniting various pendant cords. Each cord is at least two-ply with one looped end and one finished with a knot. Subsidiary cords can be affixed to any top or pendant cords, or even to other subsidiary cords. This structure of main, pendant, top, and subsidiary cords of distinct colors and adornments is created

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Fig. 1 Images of quipus and quipucamayocs from the *Nueva corónica y buen gobierno* by Guamán Poma de Ayala (1615), folios 202r, 335v, 348r, 358r, 360r, 773r, and 700r

Fig. 2 Images of quipus and quipucamayocs by Martín de Murúa, folios 76v and 124v from *Historia y Genealogía de los Reyes Incas del Perú*, Galvin Manuscript (1590), and folio 51v from *Historia General del Piru* (1616) Getty Manuscript, Ms. Ludwig XIII 16 Los Angeles, J. Paul Getty Museum

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Fig. 3 This is a contemporary replica of a quipu composed of commercial yarns. Its cords contain the information regarding the final grades submitted to the registrar of the past 15 courses taught by the author at the University of Minnesota in the past 5 years (Photo by author)

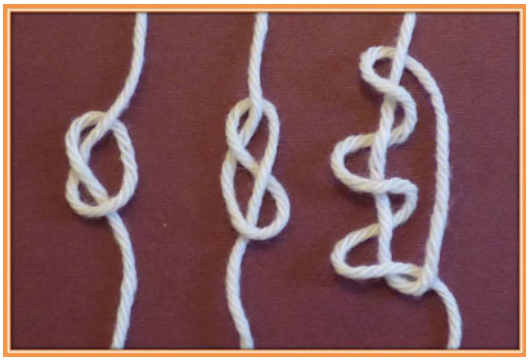

Fig. 4 Details of the single knot, figure-eight knot, and long knot with three turns (Photo by author)

before knots are tied into the medium (Ascher & Ascher, 1981, p. 21). The figure-eight knots (representing #1) and the long knots (representing #2–9) are used in the units position, and the single knots (representing #1–9) are used in all other place values (tens, hundreds, thousands, etc.) (Figs. 4, 5, and 6). This positional system locates the highest place values closest to the primary cord with the units position toward the end of the cord, and 0 is represented by a blank space in any of these positions. The use of numbers 0–9 is indicative of a base-10 counting system and this conjecture was confirmed in 1923 by Leland Locke who showed that a decimal reading of the knots of four pendant cords revealed that their summation was located on the top/summation cord that united them, a logical and common relationship of quipu cords (Fig. 7).

After reading knots as numeric values in base 10, various scholars have attempted to correlate their numeric values with qualitative data registries. After examining quipus from burial sites, Erland Nordenskiold (1925) claimed that only quipu reflecting the cosmos with mysterious religious, astronomical, and calendrical data could be buried alongside the deceased, and Day's analysis of quipus 14–3866 ("the astronomer's notebook") also suggests the astronomical data such as

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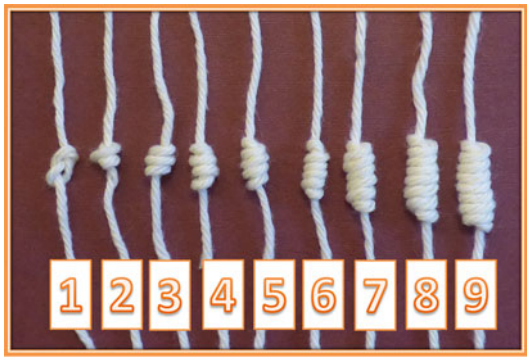

Fig. 5 Figure-eight knot and long knots #2–9 (Image by author)

Fig. 6 Single knots #1–9 (Image by author)

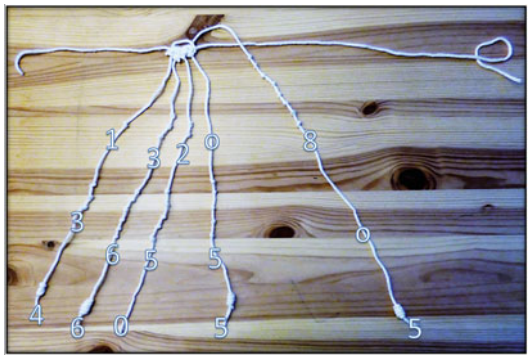

Fig. 7 A replica of the knot pattern described by Locke, illustrating cord summation, 134 + 366 + 250 + 55 = 805 (Image by author)

lunations and synodic revolutions of Mercury, Venus, and Jupiter were recorded on the quipus. "Such efforts have not, however, proved convincing to succeeding researchers, since the 'proofs' characteristically involved a careful sifting and arranging of both astronomical and quipu numbers until coincidences were formed, with the remaining bulk of numbers unexplained" (Conklin, 1982, p. 263). More recently, Robert and Marcia Ascher, Tom Zuidema, and Gary Urton identified quipus

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whose cord values resemble calendrical data (Ascher & Ascher, 1978; Urton, 2011b; Zuidema, 1988). This decimal interpretation of the knots has been widely accepted although not all quipus found have this same pattern of knots (Adawi Schreiber, Ortegal Izquierdo, Mejía Pérez, & Rojas Leiva, 2011).

The first effort to centralize quipu descriptions on a large scale is that of Robert and Marcia Ascher who recorded the following categorical data from 206 quipus (from 1970 to 1988): knot type and placement, cord type, placement, length, color, and attachments, and numerical interpretations (https://courses.cit.cornell.edu/quipu/contents.htm). The Ascher model has been used and modified in subsequent data collection projects, including that of Gary Urton (2002–2009) who also examined twist and knot direction and cord attachment (http://khipukamayuq.fas.harvard.edu/), Hugo Pereyra (2006) who initiated a Peruvian database, and the National Museum of Archaeology, Anthropology and History in Lima, Peru (Adawi Schreiber et al., 2011) that began Project Quipu in 2007 with the objective of describing their quipu archive (of over 200 samples). Gary Urton and Carrie Brezine used software programs to comb through the Harvard database, looking for matching quipus that shared a similar external structure; they found that some of the Puruchuco quipus displayed the summation values of other local quipus, concluding that information was assimilated throughout the empire, either being funneled and synthesized upward or subdivided and distributed downward. Urton and Brezine also suggest that the introductory cords on the local quipus served as location identifiers used when moving information throughout the empire (Urton & Brezine, 2005).

In addition to archival research, scholars have carried out fieldwork in communities that use "modern" quipus in order to illustrate the great variety of quipu manifestations that exist and possibly have some connection to ancient traditions (Mackey, 1970; Ruiz Estrada, 1981; Uhle, 1897). Frank Salomon together with the Ministry of Culture (Peru) has made available a documentary entitled *Tierra de Quipus* in order to illustrate these contemporary quipu traditions in the Peruvian village of Tupicocha: https://www.youtube.com/watch?v=xjEzfW4IUBs (Fig. 8).

Fig. 8 Quipu-keepers from Tupicocha, Perú (Photo reproduced with permission of the Archive of the Ministry of Culture, Peru)

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Fig. 9 Sabine Hyland with a quipu board from Mangas, Peru (Photo reproduced with her kind permission)

The enigmatic nature of this particular accounting tool stems ultimately from the difficulties inherit in preservation – of the quipus themselves as well as the ability to read their encoded messages. The number of quipu samples identified to be in existence is estimated to be around 800 (Urton, 2011a, p. 65), the majority of these being cotton samples from the arid coastal region of Peru where preservation conditions are maximal; far fewer samples of camelid knots from this central region of Peru have been traced. But, perhaps even more consequential to our understanding of this medium is the loss of the knowledge that would allow scholars to decode and "read" the knot messages. While the loss of this ancient counting practice is oftentimes attributed to destructive colonial policies and the introduction of alphabetic writing in the Andes in the sixteenth century, one colonial document suggests that the destruction of this medium actually commenced during the civil war of the Inca Empire when the captains of the aspiring Inca leader Atahualpa "killed all the quipucamayos that they could get their hands on and burned their quipus saying that they had to start over again" (Collapiña & y otros quipucamayos, 1974, p. 20 my translation) in order to erase the memory and record of previous Inca leaders. In spite of the difficulties, scholars continue working to uncover the lost legacy and past entwined in the quipu cords – a task that might be accomplished through further analysis of the quipu boards that juxtapose the colored cords and alphabetic print, Q1 exhibiting the distinct mediums side by side (see Hyland, Ware, & Clark, 2014) (Fig. 9).

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