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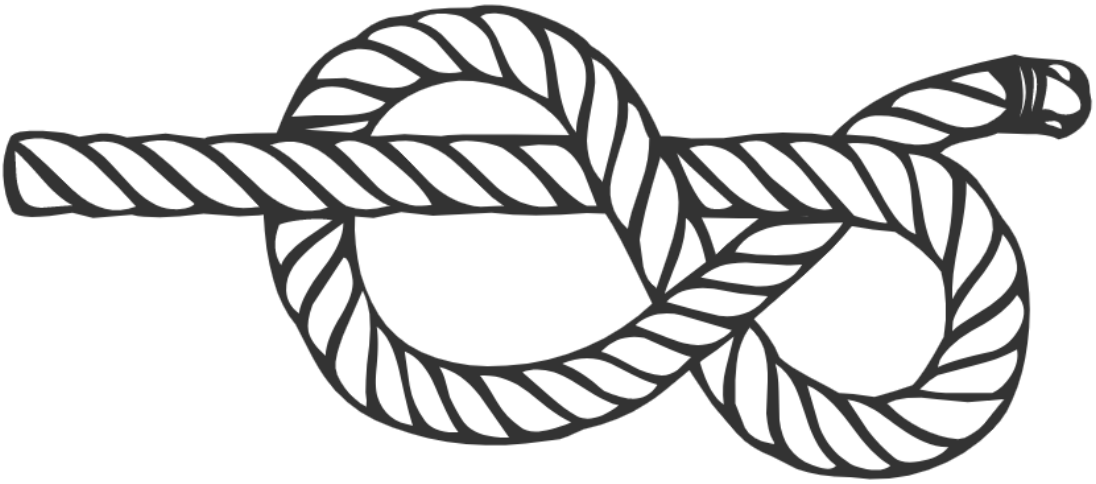

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A Story of Knots

A look into the origins of the Khipu of ancient Peru.

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Introduction

The Khipu

The Khipu is an enigmatic string device used by a number of Andean cultures of which the function has been the object of intense studies since the early 20th century (Locke, 1923; Ascher & Ascher, 1997; Urton, 2003). Khipus have a spectacularly varied history. Emerging as one of many objects used in administrative functions through the heyday of the Inka empire and its eventual decline and ceremonial function in village rituals in the present day. The primary question when talking about Khipu research has mostly been: what is it, how was it used and what was it used for? (Urton, 2003) In this Thesis I primarily want to focus on how the Khipu came to be, how did the Inka Khipu develop from earlier forms of textile writing and use in the Andean Region?

It has been almost a hundred years since Leland Locke first discovered the patterns in the knots and proposed they were used as accounting devices by the Inka's (Locke, 1923). In this time much has been debated mostly about the amount and types of data these devices were capable of recording. The opinions have shifted from simple accounting devices to mnemonic systems to full-fledged writing systems used to record tales and legends.

The Inka Empire

The Inka empire was the largest empire in the pre-Columbian Americas running some 5000 kilometres along the spine of the Andes. It was divided into four quarters which is reflected by its name: Tawantinsuyu, meaning the four parts divided together. The empire was situated in one of the most complex environments it the world. Spanning the region from the pacific coastal desert to the west to the high Andes mountains rising to about 6 kilometres in height and down again to the headwaters of the Amazon and the rainforests of the east. This made for a tremendously vertical environment in which the change of environment was in some places compressed within 100 kilometres from the coast to the jungle (Mosely, 2001). Andean systems of technology were adapted to this environment in being weighted to the management side in two ways: The management of the physical environment, which was the most dominant and dramatic feature of the empire, and, management of the social units of production at community and state level (Lechtman, 1993, p. 245). An example is the management of construction and maintenance of monumental architecture. This is the environment in which the Khipu came to play an important role, as a principle instrument of management of the Inka empire (Urton, 2017).

In order to accomplish the formidable task of building and maintaining the empire the Inka's used a complex system of tributary labour. The system worked like a corvée system whereby an inhabitant of

the empire owed the state a certain amount of labor. Inhabitants of villages and towns were divided into ayllus, or clans which were in turn subdivided into smaller groupings of tributaries. It is likely that these groupings all contributed labor on a rotational basis (Urton, 2017, p. 13). Having a record of what grouping owed what labor and or resources to the state was an arduous task and the amount of planning it took would necessitate a complex form of administration. This is where the Khipu comes into play.In the following three chapters I will take a look at the basic structure of the Khipu, the research that has been done and the history of textile use in the region to gain a better understanding of how the Khipu developed.

Structure of this Thesis

Chapter one: The Khipu

The first chapter will focus mainly on the basics of the Khipu. What was it made of, where was it used, who used it and the different materials and techniques that were used to create a Khipu. In order to do this, we must define what a Khipu is and set the broader context of where it came from. In its most basic form a Khipu is a long string on which several pendant strings were tied (**Figure 1**). These pendant strings could contain knots but don't necessarily always do. It was mainly used by the Inka in the region of modern-day Ecuador, Peru, Bolivia and Chile. Although earlier Khipu or Khipu like devices have been found for example the Wari Khipu (Conklin, 1982).

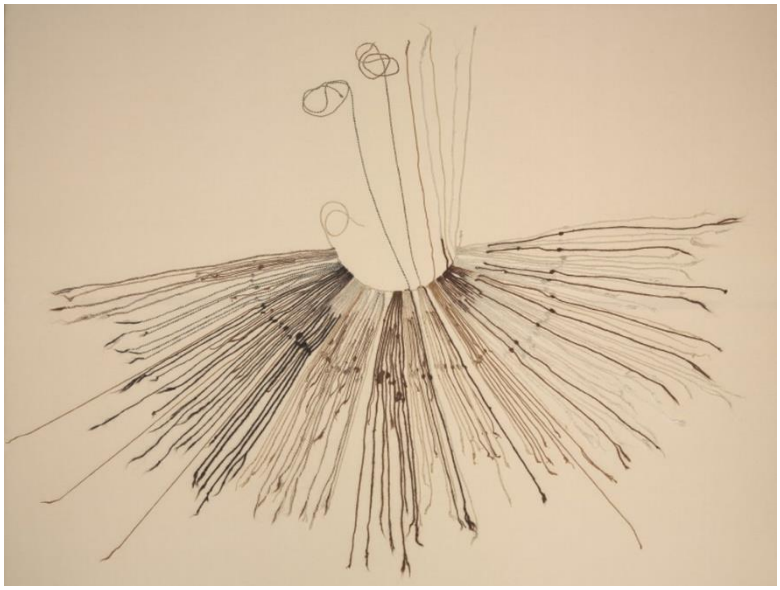

Figure 1 Inka Khipu with top cords clearly showing

Chapter two: History of Research

In the next chapter I will focus on discovering the development of research into the meaning of the Khipu. What kinds of data could the Khipu record, was it solely a device used for accounting or was there more to it than that? I will focus on three different theories that have been developed over the past century.

When Leland Locke first discovered how the three types of knots could be used in making decimal arrays, encoding arithmetical relationships, the focus was on deciphering the knots (Salomon, The twisting paths of recall: Khipu (Andean cord notation) as artifact, 2013, p. 16). Locke's work however failed to take anything other than knots into account. From the 1990's on there was a flurry of new research. The well-known work of Ascher and Ascher described the properties of several museum Khipu specimens. They insisted that spatial arrangement was important and that the knots and combinations of them signalling numbers are only a part of the larger combinational structures (Ascher & Ascher, 1997, p. 57).

The maximalist approach was used by the archaeologists William Conklin and Gary Urton (Salomon, 2013; Conklin, 1982; Urton, 2003). They state that many features may bear coded meaning. They also consider colours, colour combination, ply techniques, knot direction and the 'obverse / reverse' placement of pendant loops. This greatly increased the amount of potentially recognizable patterning's a Khipu could have and thus also the amount of data a Khipu could potentially hold. Still the only decent decoding of Khipus so far has been of administrative data (Urton, 2003).

Starting in recent years a new theory has emerged that states that it is possible that certain Khipus were made to hold narrative information. Sabine Hyland argues that through the use of special colour coding's in combination with knot and ply direction a form of narrative could be constructed. This is supported by Spanish chronicler's who gave accounts of Inka using the devices to tell stories about and "recount the history" of Tawantinsuyu. (Hyland, Ware, & Clark, Knot direction in a Khipu/Alphabetic text from the central Andes, 2014)

Chapter three: Origins

The last chapter of this thesis will set about discovering the origins of the Khipu. Where did it originate and how did it develop to become the main instrument of relaying information in the empire? Through the years of researching the Khipu it has become evident that although the Inka claimed the Khipu as a device of their own invention the Khipu had a long and varied history before that (Salomon, The twisting paths of recall: Khipu (Andean cord notation) as artifact, 2013, p. 21). A substantial contribution was made by the textile archaeologist William Conklin, when in 1982 he showed that the Khipu had already reached a complex form some 700 years before the Inka conquests began, albeit a different one. An

excavation of a Wari culture mummy at Pampa Blanca on the south coast of Peru turned up eight fragmentary pieces of what appear to be Khipus. The burial was dated to about 700 CE (Conklin, 1982, p. 268). The Wari culture was an extensive culture located in the South of Peru. One of two cultures that dominated the Middle Horizon. It appears that this Khipu found at the Wari burial together with some other findings of less clear context show us that at least the idea of a Khipu was in play long before the Inka. Conklin identified that the Wari Khipu was not identical to the Inka Khipu, there are a few material peculiarities that suggest a somewhat different usage. It seems that the emphasis on threads, knots, wrapping and of using textiles to signify meaning is very prevalent in the history of Andean cultures.

Many examples of textile use exist, from the elaborate designs and markings on Inka clothing called *tocapu* to the use of textile depictions of the gods in Chavín culture (Brokaw, 2010, pp. 41-43). Another Andean medium that is know is the Thread-wrapping of sticks. It seems this custom existed before the Khipu, alongside the Wari Khipu and was even used well into Inka times. A number of these sticks of pre-Inka, Inka and post-Inka survive to this day and are preserved in museums around the world. According to Salomon, the practice of stick wrapping belonged primarily to a funerary culture with many wrapped sticks being found next to mummies. (Salomon, The twisting paths of recall: Khipu (Andean cord notation) as artifact, 2013, p. 22)

It must be noted though that textile is by no means the only medium used to relay information in Andean cultures and the use of other methods of conveying information are known. The Moche iconographic practice of beans with painted designs, often depicted as carried by so called “bean runners”. The Moche are also well known for their decorative pottery which often depict scenes reminiscent of the styles used by the Maya and later Aztecs of Mesoamerica (Brokaw, 2010, pp. 60-62).

Issues and Limitations to Understanding

One problem with determining the exact workings of the Khipu is the sources we have of the Khipu actually being used, as the only sources we have are Spanish translations and interpretations. If the use of the Khipu changed much in the period of Spanish rule is not certain. The usage of Khipus in later periods is called “late Khipu use” and refers specifically to the usage of Khipu devices from the end of Inka independence onwards. The Spaniards invaded Peru in 1532 and conquered and ransacked the capital Cuzco in 1535. What we know of the Khipu from the earliest Spanish sources suggest that it was not solely an Inka medium and was widely used throughout the empire. The chronicler Inka Garcilaso de la Vega, who was half Inka himself, wrote that every village had at least four Khipu keepers that each kept several mutually verifiable records (Salomon & Nino-Murcia, 2011). If so this means that seeing the total inhabitants of the Inka Empire was in the millions, the number of Khipu keepers must have run somewhere in the tens of thousands. As these Khipu were also used on the very lowest level of the

Empire bureaucracy, there probably was a good base understanding of them by the general populace. It seems unlikely that the later use of the Khipu was a post conquest appropriation of a recording method formerly used by only the aristocratic classes. It probably represents an adaption and further use of an already widespread skill present at most levels of society. With the decay of central authority from the empire, the Khipu became a useful method of keeping the private data reserve of local indigenous polities. In this way the Khipu afforded a way for locals to hold some semblance of data independence from the Spanish records and scribes (Salomon & Nino-Murcia, 2011). As written by Blas Valera, one of the Spanish scribes: ‘‘We [Spaniards] have been dealing with them [Peruvians] 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.’’ (Salomon & Nino-Murcia, 2011). However, by the end of the 17th century the replacement of the Khipu as the *official* means of record keeping was virtually complete and documents written in Spanish became the norm. Village elders though still kept records on their Khipus for many decades after. By the time the Spanish writers began to take an interest in the Khipu records, the nature of the information recorded had changed much however and it is likely that with this change the techniques and skills of the traditional Khipu Kamayuq slowly faded though alternative uses of Khipu like devices went on to well into the 20th century and even today (Urton, From Knots to Narratives: Reconstructing the Art of Historical Record Keeping in the Andes from Spanish Transcriptions of Inka Khipus, 1998).

Spanish colonial administrators made heavy use of the Khipu accounting system, at least in the early period (1530s through to the 1550s). From the 1560s onward there was more and more systematic integration between the cord based systems and new administrative papers. Many of these papers survive to this day and are sometimes used as basis for trying to interpret colonial era Khipus. The principal issue with these documents however is the nature of the relationship between the information that was recorded on a given Khipu and the information that appears on the Spanish transcription of the reading of said Khipu. Often these transcriptions were the product of a reading by a Khipu kamayuq of what a Khipu said, translated by a bilingual interpreter (e.g. Quechua/Spanish) and recorded by a Spanish scribe. So there are 3 stages of interpretation between us and the Khipu (Urton, From Knots to Narratives: Reconstructing the Art of Historical Record Keeping in the Andes from Spanish Transcriptions of Inka Khipus, 1998, p. 412). This made the translations prone to errors and political influence.

Unfortunately there are several issues with the Khipus presence in the archaeological record which contributes to the mystery of the origins of the Khipu. The perishable nature of cotton and camelid fibres used in Khipu construction makes them highly susceptible to disintegration over time. Additionally, the Spanish conquistadors who invaded and colonized the Incan empire in the 16th century may have intentionally destroyed many Khipus as part of their efforts to suppress indigenous culture and impose their own language and systems of record-keeping.

Chapter one: The Khipu

1.1 The Inka

To get a clear picture of what a Khipu is, it is useful to define the area and periods in which they were used and which cultures they are associated with. The earliest signs of a Khipu we find that can be unambiguously called a true Khipu is between around 700 and 900 CE with the Wari Khipu (Conklin, 1982). These already exhibit the features of a fairly well-developed system that would have derived from earlier objects and similar practices. Though we have no access to earlier well defined Khipu, media such as these originally develop hand in hand with socioeconomic and political institutions and other forms of media (Brokaw, 2010, p. 31). It may be useful therefore to start with a short review of major Andean cultures that existed prior to the Khipu appearing in the archaeological record. So before we focus on the Khipu and its history we shall begin with a short chronology.

1.1.1 A short Chronology of the Andes

In constructing a history of Pre-Columbian Andean societies, archaeologists generally employ a modified version of John Rowe's chronology of Peruvian pre-history (Rowe, 1962). Note that this model is based on the identification of cultural influences as they appear in the archaeological record of the Ica valley. This area is influenced by most of the major Andean societies, although by no means all of them so the chronology may not be as accurate for lesser known societies whose sphere of influence never reached as far as the Ica valley. Each of the following Horizons corresponds roughly to the arrival of the influence of a major Andean society in the Ica valley: The Preceramic period (until about 1800 BCE), the Initial period (from 1800 to 900 BCE), the Early Horizon period (900 to 200 BCE), the Early Intermediate period (200 BCE to 600 CE), the Middle Horizon period (600 to 1000 CE), the Late Intermediate period (1000 to 1400 CE) and the Late Horizon Period (1400 until the Spanish conquest in 1532). For the purpose of this thesis we are mostly interested in the periods ranging from the Early Horizon to the Late Horizon periods. The Early Horizon begins with the arrival of cultural traits associated with Chavín de Huántar which originated in the north-central highlands. The Middle Horizon period begins with the arrival of Tiwanaku and Wari cultural influences, this is also the period in which the Khipu makes its first appearance. The Late Horizon period starts with the arrival of Inka influence in the area (Rowe, 1962).

It is important to note that the term "Intermediate period" does not necessarily imply a general qualitative difference between cultures of the Horizon and Intermediate periods on the whole. Rowe's chronology

merely reflects that the art style of cultures from the intermediate periods did not extend to the Ica valley. Styles such as those associated with the Moche, Chimu or Nazca are more local when compared to Chavín, Tiwanaku and Inka. Archaeological research over the last couple of decades has made it clear that the Early Intermediate Moche and Late Intermediate Chimu had a high degree of complexity (Brokaw, 2010, p. 34).

There is also a strong difference in the geopolitics as exhibited by Andean Civilization compared to other areas of the world. Originally, Andean Civilizations rose out of the nature of smaller-scale economical practices developed at community and regional levels. In many other areas of the world, trade networks developed as a way to acquire luxury items or goods to supplement the existing subsistence economy. However, in the Andes trade relationships seem to have been an essential part of the subsistence economy itself (Moseley, 1978; Murra, 1975). According to archaeological evidence, the fundamental principles of corporate labor and reciprocity that was the essential basis of almost all Andean cultures at the time of the Spanish conquest, emerged very early .This model differed greatly from what emerged in the Middle East and Europe. The Andean geopolitics were characterized by lateral relationships that inherently affected the nature of later hierarchical structures that built upon them. One of the major factors in the development of this structure is the geography of the Andean region. The steep incline of the Andes and the flat altiplano regions on high altitudes are not very conductive to large and dense populations. Because specific locations have a low degree of ecological diversity, subsistence in these regions require the exploitation of different ecological zones. This means that, in order to thrive, a community must have access to goods produced in several locations. Andean communities developed two different strategies for this. Either what has become known as the “altiplano” model or the “archipelago” or “vertical” model. In the Altiplano model of economic integration a community specializes in products supported by their local ecological zone and establishes trade networks with other communities specifically in other zones. In the vertical model, a community creates its own outposts in an ecological zone to which it needs access (Murra, 1975; Moseley, 1978). Both models were employed in different places at different times but it is clear that they both relied on, and reinforced, communal institutions (Brokaw, 2010). Communal institutions, like for example the corvée system required a lot of coordination and may have triggered the need for a system to record and ‘remember’, like the Khipu.

1.2 Khipu Accounting

The Inka Khipu was mostly used as a tool to record tribute. Tribute was levied in the form of a labor tax in the Inka empire. That means that everyone was obligated to work on state projects for a specified amount of days each year. The Khipu could be used to record tribute levels and Inka accountants, the Khipu Kamayuqs, used these to assess local levels of tribute and assign tasks to local workers. The way tribute was accounted was largely done in a hierarchical structure using base ten which is also reflected

in the method of recording on a Khipu. From the lowest level, the local level, tributaries were grouped in units of 10 workers. One member of the group of 10 was assigned the role of "Chunka Kamayuq" or "Organizer of 10". Then one level above that five groups of 10 workers were organized into a unit of 50. This grouping would have one member assigned the role of "Picha-Chunka Kuraka" or "Lord of 50". One level above that would have two groups of 50 workers combined into a group of 100 under the authority of a "Pachaka Kuraka" or "Lord of 100" This hierarchy continued like this all the way to the top. Lords of the 80 provinces were called "T'oqrikoq" and each of them fell under the command of one of the lords of the four quarters who in turn reported to the emperor or "Sapa Inka" in Cuzco (Urton & Brezine, 2005, p. 1065)

The information recorded on the Khipu's would move between the local levels up to the regional levels and on until it reached province capitals. On each step of the hierarchy a Khipu Kamayuq would make a copy because governors and leaders of each tier were required to keep copies of Khipu accounts so that: "*No deception could be practiced by either the Indian tribute payers or the official collectors."* (Urton & Brezine, 2005, p. 1065) Presumably the instructions of the Sapa Inka or other high level administrators would have moved via Khipu the same way but down the hierarchy, again with copies made on each step. The Khipus were carried by "Chaskis" (Messengers who were able to read the Khipu) on foot who would work through a relay system. This way a Khipu could travel around 240 kilometers in a single day on the "Capaq Nan" (The Inka road system) (Urton & Brezine, 2005, p. 1065).

Khipu Kamayuqs, while probably the only people to actually make Khipus, were not the only ones in Inka society who could read them. According to Spanish sources there were Inka historians that were versed in the use of the Khipu and they used them to relate the history of the Inka empire (although there is discussion as to how this was accomplished and if it was accomplished with the aid of Khipus alone) (Ordish & Hyams, 1996, p. 113). Those who eventually became the empires bureaucracy, members of the elite, were also taught to read the Khipu in the "Yachay Wasi" which means house of teaching.

1.3 Basics Khipu Structure

The basic structure of an Inka Khipu consists of a main chord with pendant chords. Pendant cords are mostly made in sets and groups, with empty spaces between them. Such a group often has a sequence of colors that repeat. The pendant chords are fixed to the main chord by the use of half-hitch knots.

1.3.1 Materials

Khipu's are mostly made of cotton, but there a few examples made of camelid wool that survived. Although, this may just be a representation of better preservation conditions as in early colonial sources, camelid wool is usually mentioned as the common medium, for instance, according to Spanish chronicler Martin de Murúa Khipu's made from camelid wool were usually reserved for narrative stories and chronicles as they were more easily dyed in vibrant color (Conklin, A Khipu Information String Theory, 2002, p. 64; Hyland, Writing with twisted cords, The inscriptive Capacity of Andean Khipus, 2017, p. 417). Camelid wool, usually Alpaca wool, was also on occasion used as an extra thread. Usually it would be a brightly colored short piece of string that was plied next to a cotton thread as if to emphasize something. At least eight separate natural colors of cotton were used in construction which are: White, light brown, medium brow, dark brown, chocolate, reddish-orange brown and mauve. Occasionally dyed cotton was also used, mainly red and blue (Conklin, A Khipu Information String Theory, 2002, p. 64). In some better preserved specimens, we can also find inclusions embedded in the cord. These inclusions mostly consist of cotton balls and cotton seeds which could imply that the basic cords were spun on-site.

1.3.2 Cords

The Khipu was in construction not unlike the suspension bridges that were made by the Inka. The main cord also called the "primary cord" functioned as a suspension line with pendants hanging from it. It provided the strength and structure for the Khipu. Usually it had two different ends. On one end there would be loops, formed by the doubling or plying of the cord. The other end was the "open" end and consisted of the free ends of threads. Most of the time this end was knotted into a ball. This end is also called the dangle end (Conklin, A Khipu Information String Theory, 2002, p. 66). Attached to the primary cord were the secondary cords or "pendant cords". The pendant cords were attached to the primary cord using half-hitch knots. A pendant usually contains a single number that is expressed in a base-10 positional notation. Frequently the pendants would be grouped in sets of *n* pendants, with spaces between the groups. Often these groups would have repeating sequences of color, alluding to some form of hierarchy (Salomon, The twisting paths of recall: Khipu (Andean cord notation) as artifact, 2013, p. 16).

Khipu structure can become very complex with pendants often having their own subsidiary pendants, called subsidiaries, and those can carry sub subsidiaries etc. In this way a Khipu registry can become several layers deep. There is even a special pendant called a top chord which contains a summary of other pendants. Several forms of top cords exist: those that are adjacent to the group of pendant cords,

those that are attached to the center of the group of pendants and those that are encompassing the group entirely.

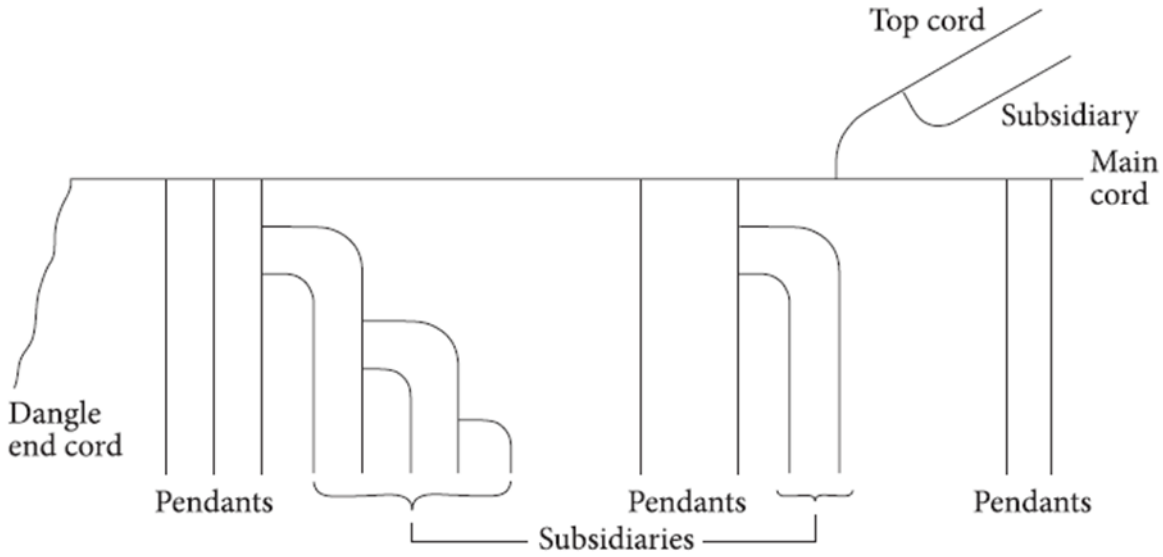

Figure 2 Cord schematic, showing all different cord types

1.3.3 Color

Colors vary from natural fiber color to vibrant dyed colors, in particularly blue. There are three separate techniques that have been discovered so far, that were used to created multi colored strings: barber pole pattern, mottled pattern and a gradual pattern in which a single cord changes color (Salomon, The twisting paths of recall: Khipu (Andean cord notation) as artifact, 2013, p. 16). Plying can be very complex with different types used especially in the main chord. Sometimes even a type of underlining is used by running through a single thread in a different color like the example mentioned before with the use of camelid wool.

1.3.4 Knots

Over 80 years ago Leland Locke discovered how the basic knot structure of the Khipu functioned. He discovered the three varieties of knots and how they were used to create different numbers (Locke, 1923). The three basic knots used are: the long knot, used to express single digits, the single knot, used to express tens, hundreds and thousands and the figure eight know, used to explicitly express the number 1. With these knots in combination with the positional system, every whole number can be expressed. The number 0 was expressed by intentionally leaving a blank space. Though there are surviving accounts of Spanish chroniclers noting that Khipu Kamayuqs often used fractions in their recounting of tribute e.g. 7 and a sacks of beans (Salomon, 2013).

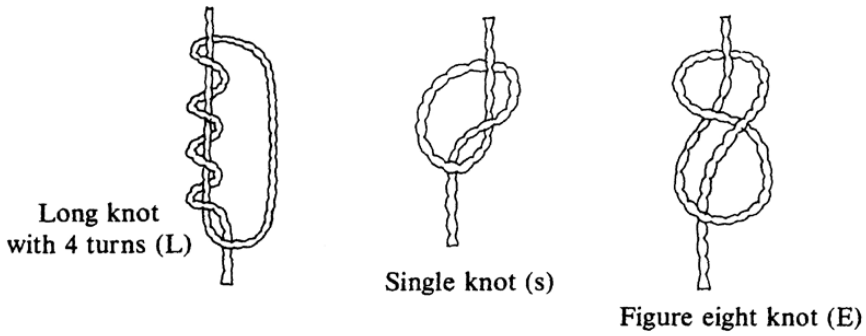

Figure 3 Knot types

Chapter two: History of Research

2.1 Meaning

The meaning of Khipus is still today subject of a lot of discussion, and has been for centuries. From the earliest observances made by Spanish chroniclers to the discovery of numerical data in the last century. Sadly, much of the information about the Khipu and indeed most of the Khipus themselves have been lost to history. In this chapter I will set out the most important moments in Khipu research.

2.2 Post Conquest and the Spanish Chroniclers

In the early stages of the colonial period, the traditional Inca institutions that supported the imperial throne had collapsed. The Spaniards immediately set about trying to find the Inca Khipukamayuq in order to create oversight into their new domain and serve as informants. This was done at the behest of the King of Spain who had an interest in the indigenous past of the native population of Peru. Unfortunately the Spaniards had arrived in the midst of a civil war between the lords Huascar and Atahualpa who were engaged in a conflict because of the death of Huayna Capac, the previous Sapa Inca who had died months before. The conflict was not only on the battle field but also on the ideological front. Atahualpa, in a bid to legitimize his rule set about destroying and revising thousands of Khipu of the Imperial records. The collapse of the institutions brought about by the Spaniards in combination with the results of the civil war destroyed most knowledge of the imperial historiography and the survival of the most important Khipus (Brokaw, 2010, p. 127).

In 1542 the successor of Francisco Pizarro, Crístobal Vaca de Castro ordered the first inquest into the history of the Incas. The resulting document only survives in parts. Copies of the text are incorporated into later documents like the *Relación de los quipucamayos* or *relación sobre la descendcia, gobierno y conquista de los Incas* (citaat invoegen Collapina, Supno et al) Governor Vaca de Castros work also details the way the document was created. It reveals a significant difference in the knowledge of imperial Inca history between the general population and the Khipukamayuqs (Brokaw, 2010, p. 130).

Subsequent governors and viceroys conducted their own investigations. One of those was Polo de Ondegrado who in a document dated 1561 refers to the Khipu as a primary source for Inca history: *"Many times, for other reasons, I have dealt with this method in different parts of this kingdom, and I have informed myself about the old Indians… In that city today are found many old officials of the Inca,*

of religion and government and another thing that I would not have believed if I had not seen it, was that laws and statutes were represented using threads and knots, the one just like the other, and the succession of kings and the time that they governed, and those who were charged with these [records], which were not a few, can still be found… (Citaat Polo de Ondegrado 1561).

There is however ambiguity in Spanish texts that survive to this day whether or not the Khipu was actually a primary source for information. Some texts, like the one from Polo, explicitly mention the Khipu while others make no mention of it or only vaguely refer to it (Brokaw, 2010, p. 130).

One of the most comprehensive accounts we have of the Inca Empire was ordered by Fransisco de Toledo the Viceroy of Píru in 1569. His primary concerns for ordering this account were the strict enforcement of royal laws and decrees. In order to do this he had to evaluate the status of the native population and if they indeed had rights to their lands or not. For two years he traveled with his entourage and visited many places in the former Inca Empire. Toledo employed several scribes for his endeavor. One of his most important scribes was Pedro Sarmiento de Gamboa who in 1572 produced the work: *História Índica.* Another was Cristóbal de Molina who sometime between 1570 and 1574 finished his now lost work: *Historia de los Ingas.* These works seem to be the base for many works of later scribes and chroniclers (Brokaw, 2010, p. 138).

Around 1580 coinciding with the end of Toledo's rule as Viceroy there is a sharp decline in the number of Khipu cited as primary sources in Chronicles. There is no consensus on why this happened. Some scholars cite the Third Lima Council's order of 1583 in which Khipus were ordered destroyed. Others contend that only Khipus of a religious nature were destroyed whereas administrative Khipus were left untouched and the reasons had more to do with the shift of legal issues in the now firmly established colonies of Peru (Brokaw, 2010, p. 142). As it stands, by the late sixteenth and early seventeenth centuries no more large scale investigations were conducted and the focus of chronicling shifted the administrative to more small scale investigations mostly conducted by Jesuit Clergymen and Native Chroniclers.

2.3 Early Encounters and Speculation in the modern Era

Two hundred years after the conquest the use of the Khipu had largely disappeared. Although some Khipus were still used in villages and towns, as simple counting devices for tribute and labor division (Urton, 2003, p. 12).

In the 19th century, European explorers and scholars, such as Antonio Raimondi and Charles Wiener, encountered these Khipus in the Andean region. They speculated about the use, and their initial understanding was that Khipus were simple mnemonic devices or primitive forms of writing without a decipherable language or numerical system (Urton, 2003, p. 12).

In the early 20th century Leslie Leland Locke (1875-1943) made the single most important breakthrough in the research of the Khipu. In his work, *The Ancient Quipu, A Peruvian Knot Record*, Locke demonstrates the mathematical nature of the Khipu (Locke, 1923). Locke attempted to classify Khipus based on the number and type of cords, knots, and colors used, suggesting that they might encode numerical or accounting information. Locke's classification system and initial interpretations of Khipus influenced later researchers in the field and his work laid the groundwork for scholars who sought to further decipher the structure and meaning of Khipus. However, it is important to note that Locke's approach focused primarily on the physical attributes of Khipus and did not delve deeply into the underlying linguistic or symbolic aspects.

2.4 The Anthropological and Ethnographic Studies of the Late 20th Century

The next great breakthrough in Khipu research came in the late 70's and 80's when Marcia and Robert Asher published their well-known work on the Khipu: "The code of the Quipu" (Ascher & Ascher, 1997). They describe the way the Khipu was not solely used as a mathematical tool and spatial arrangement and that the combinations of knots signalling numbers are only a part of the larger combinational structures. This approach was taken even further by archaeologists like William Conklin and Gary Urton.

The work of Gary Urton mainly focuses on discovering patterns in Inka Khipus by documenting and categorizing as many known Khipus as possible. His database now contains many hundreds of Khipus and through the use of special software, connections can be made about for instance color use and ply type in order to broaden our understanding of the many possible ways of using the Khipu (Urton, 2017).

William Conklin is primarily focused on the material basis of combinatorial structures in Khipus. His ideas about what he calls "Inca insistence" in utilization of spatial arrangements involving systematic

repetition and recombination of fundamental elements (Conklin, 1982). It implies that the numerical knot combinations are merely fragments of broader structures. These hypotheses evolved in what we now know as the maximalist approach. The maximalist approach is a hypothesis on how many features in Khipus might have an alternate meaning. Beyond just the knots, this hypothesis also takes in account colors, combinations of colors, rightward versus leftward spinning, plying, S and Z knots, and the placement of pendant loops in a 'recto / verso' or 'obverse / reverse' style (Ascher M. , 2005, pp. 101, 102). This approach as used by Conklin and Urton has greatly increased potential number of recognizable patterning's in Khipus and possibilities and quantity of information a Khipu could hold. Although Conklin has worked on the Inca Khipu, his main focus of work has been on the supposed precursor of the Inca Khipu, namely the Wari Khipu. The discovery of the Wari Khipu as a separate object challenged previous assumptions about the origins and development of Khipu as a sole Inca invention (Conklin, 1982).

The Wari Khipu of course differed from Inca Khipus in several ways, including their use of a binary system rather than a decimal one, and their inclusion of non-numerical information such as colors and materials. By studying these unique artifacts, Conklin prepared the way for new insights into the ways in which different cultures used Khipus to record and transmit information, and how these systems evolved over time.

2.5 Recent Decoding of a Khipu

In recent years new discoveries have been made that build on the findings made by Urton and Conlkin. In her 2017 article "Writing with Twisted Cords" Sabine Hyland presents the case of 2 newly discovered Khipus. These Khipus were found in the village of San Juan de Collata and Hyland examined these Khipus that were stored and preserved by the village authorities. According to Hyland the structure of the Khipus is relatively similar to the structure of Inka Khipus (Hyland, 2017, p. 413). She found that they contained 95 different symbols. This makes the collate Khipus within range of logo Syllabic writing that is usually between 80 and 800 symbols. Although the Khipus lack the more repetitive nature of old Inka regional Khipus, they do have more variety in color and fibre (Hyland, 2017, p. 414). Logosyllabic writing often uses a form of rebus and Hyland makes the comparison between Andean catechetical "Cakes" made of clay. These cakes use rebus style symbols and objects to represent words. A blade of grass, called *Ichu* for example can mean *Jesús* (Hyland, Ware, & Clark, 2014, p. 414). If the Khipus used a similar style, it is possible they contained far more information than previously thought.

Chapter three: Origins

3.1 Textile use in the Ancient Andean region

Textile production in Peru dates back to before the Pre-Ceramic period with the production of reed mats. Later, during the Pre-Ceramic Period, spun cotton and camelid fibre thread became the primary materials for textile production. (Cheek, 2020, p. 14) This period witnessed an increased complexity in textile production. A variety of dyes was being used, including the first documented use of indigo, which was discovered at the site of Huaca Prieta and dated to approximately 4,000 BCE (Cheek, 2020, p. 14). Textiles became an important medium for the expression of iconography, with surviving figural imagery from early textile fragments depicting mostly animals.

Towards the end of the Initial Period the elite began to place an increasing emphasis on individual wealth and status objects. This was apparent in an increased complexity of textile production in the Early Horizon Period, both in terms of imagery and technical aspects of the textiles. Chavín style or Chavín influenced textiles from the South Coast site of Karwa are some examples (Cheek, 2020, p. 15). Additionally, Early Horizon textiles utilized thread wrapping in their construction that allowed artists to create large textiles with complex design elements relatively fast in comparison to earlier artists (Conklin, 2008, p. 263).

The Paracas and Nazca cultures of the Late early Horizon and Early Intermediate periods continued this trend and produced some of the most complex textiles and embroidery in the world. To create such elaborate textiles, careful planning and counting were necessary to ensure symmetry and pattern consistency, not just of the size but also the colour. It has been posited that the Nazca weavers utilized patterned symmetry and various directional oppositions in their textile production, aimed at imbuing the figures depicted in their textiles with a sense of movement. The weavers are believed to have been

guided by a complex system of categorization that relied on typologies of animals and humanoid beings. (Frame, 2004, pp. 137, 167).

There are several indications that suggest the Khipu evolved from the use of textiles in Pre-Columbian societies, as was mentioned in chapter 2.1. For instance, William Conklin suggests that the structural

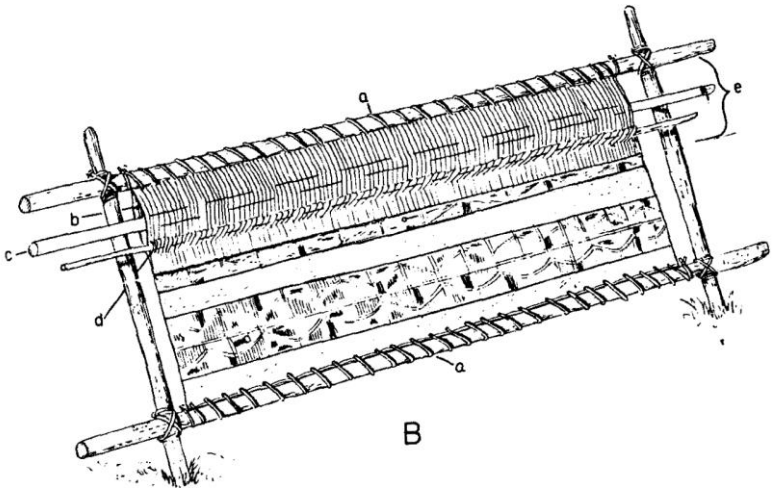

Figure 4 Middle Horizon horizontal loom

form of Wari Khipus may suggest a relationship to the format of ancient Peruvian looms which were used to create patterned textiles (see figure 1). In the case of the Wari Khipu it seems that the Middle Horizon horizontal looms we know developed from earlier models used by the Nazca and Paracas cultures. These looms seem to be especially suited to constructing Khipu on which Conklin suggests the main cords may have been plied and spun, although the knots on the Khipu were done by hand (Conklin, 1982, p. 265).

Another indication is the emergence of the Paracas culture around 800 BCE on the South Coast of Peru and the appearance of wrapped batons and staffs in the archaeological record that indicate the intentional use of patterns as a means of communication (Splitstoser, 2014, p. 47). I will go more in depth about the relationship between these batons and the Khipu in chapter 3.5.

3.2 Ancient Origins

In order to place the emergence of the Khipu in the broader context of Andean Cultural development, we must look at the development of semiotic practices in the Andean Region. Semiotics, also known as semiology is explained as the practice of conveying meaning through signs and symbols (Brokaw, 2010). It is primarily concerned with how meaning is created and conveyed between humans using various forms of communication, such as language, writing, art, music and for example textiles. It explains how people use signs and symbols to communicate and how they interpret and assign meaning to them based on cultural and social conventions. It also investigates the relationships between these

signs and symbols and the things they represent, such as the relationship between words and the concept they describe. The term was coined by Ferdinand de Saussure, a Swiss linguist in the early 20th century (Brokaw, 2010).

As I mentioned before, systems of information storage and transfer using textiles have a long history in the Andes and Coastal Regions of Peru, as well as other neighbouring countries in South America. In fact, textiles were used for functional purposes even before the production of ceramics in Peru, spanning back several millennia. Basic weaving techniques like knotting, looping, twining and sewing were textile forms mastered early in antiquity. This sets a cultural precedent for how textile arts developed in the region.

The exact earliest origins of the Khipu in the Andes are unclear. One theory put forth by Tristan Platt is that it is linked to the hunting and herding societies that were responsible for domesticating camelids (Platt, 2002, p. 226). This idea is supported by the way they used threads to hunt timid vicuñas. A thread was set up on stakes surrounding an open plain, with a space left open for the animals to enter. The thread was marked at intervals with red tassels made of camelid wool, which prevented the vicuñas from breaking the circle. The tassels on the thread were clearly meant to help the hunters catch more animals and were associated with ideas of numbers. The Aymara compound word "Chinujasitha" demonstrates the semantic link between "counting" and "catching," as it translates to "tie a shawl, or handkerchief," "knot a thread or cord," and "keep prisoner for a long time." The image of the knots "trapping" bits of information, like vicuñas, suggests that they ensured the steady availability of information (Platt, 2002, p. 226).

3.3 Caral / Norte Chico

One of the most controversial finds in the area of Khipu studies is the Khipu that was found by dr. Ruth Shady at Caral. Although this find was never officially published it is reported in the work of Charles Mann (Mann, 2005, p. 1008). Caral or Caral-Supe is part of a larger area of major population centres in the North-central coastal region of Peru. Collectively these sites are often referred to as the Norte Chico culture. This civilization flourished between roughly 3700 BCE and 1800 BCE or the late archaic period of pre-Columbian prehistory. The culture is pre ceramic, meaning it completely lacked the use of ceramics, and had almost no surviving visual art. There is however tentative evidence of advanced textile technology (Mann, 2005).

A Khipu found in Caral would predate any other Khipu found in the archaeological record, the Wari Khipu, around 3000 years. The Wari Khipus come from around 700 CE and are generally taken as the first true Khipus (Conklin, 1982, p. 71). The object found at Caral however poses several problems. The

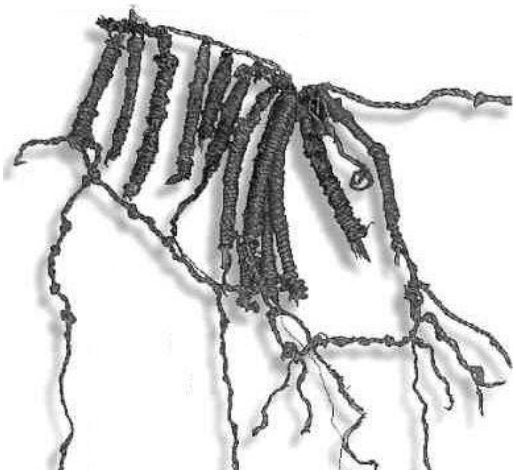

Figure 5 Caral Khipu

first problem is the identification as a Khipu like device or even a semiotic medium. Although the object has the common hallmarks of a Khipu, namely a main cord with pendant cords attached. Some of these pendant cords are wrapped around sticks which is reminiscent of the Wari Khipu. Some cords even have knots in them, although these knots are sporadic (Mann, 2005). It is possible though that this object has nothing to do with Khipus at all, certainly because other rather similar objects found at the site have been classified as necklaces (Shady, 2007, p. 55). Therefore, it is not entirely clear on which criteria the identification as a Khipu are based. Because of the isolated nature of the specimen it would be difficult to make any definitive identifications. Another issue stems from the fact that there are no comparable objects found in the intervening 3000 years between Caral and the Wari (Brokaw, 2010). This can however be explained by the inherent fluid nature of the medium itself, knots on strings could be tied and untied and the strings themselves reused. In time this means the strings would have deteriorated due

to wear and tear (Brokaw, 2010, p. 36). Although it must be said that this is of course also true of the later Khipus, but perhaps volumes of use and practices were different as Khipu use evolved over time.

3.4 Chavín Iconography and Textile Art

In the Early horizon period a new culture rose to prominence centered around the site of Chavín de Huántar. Chavín culture developed in the northern Andean highlands of Peru around 900 BCE and lasted to around 200 BCE. This period is characterized by a strong move to centralization of state and religious power, and also the development of ceramics, religious art, textile craft and metallurgy (Burger, 1992). The Chavín style pottery associated with this culture are found spread over a large geographic area. The construction of grand monumental architecture in Chavín de Huántar suggests the mobilization of surplus labor on a large scale. These labourers were typically recruited from the surrounding regions. Through this system the site itself grew to several thousand people. While a great part of the population were farmers producing crops to sustain the region, many would have been engaged in some form of service to the priesthood or other religious institutions.

The ritualistic nature of this religion has deep roots in Andean cultures and societies although it is clear the practices were greatly intensified and centralised. In order to grow, this more centralized authority had a need to expand and to socially integrate diverse societies by spreading their ideology (Contreras, 2017, p. 55). Chavín iconography uses several themes through which it expresses this ideology. According to Burger these themes encompass harmony, balance and the resolution of opposites (Burger, 1992, p. 180). In this way we can see the use of secondary media to spread ideas and ideology.

Chavín Culture made extensive use of textile art, as is evidenced by the increased presence in the Archaeological record. The textiles of Early Horizon Chavín culture are noted by their use of surface painting and thread wrapping techniques to create complex iconographical schemes. With the addition of these new techniques, the creation of larger textiles with intricate designs became relatively more easy compared to the techniques used by earlier cultures (Conklin, 2008, pp. 263 - 265). There are no known Khipus from this era but it appears that thread wrapping techniques, the use of loops and knots were well established. Conklin proposes that it is in this Early Horizon period that the basic idea of textile based writing systems is formed (Conklin, 2008, p. 275).

3.5 Paracas Batons

Early Paracas art sees heavy influence by the artistic styles of the preceding Early Horizon Period cultures, such as that of the Chavín civilization. Archaeological evidence of textile information tools was uncovered through the discovery of wrapped batons from the site of Cerrillos, discovered in 2003.

This discovery was made by Mercedes Delgado and Dwight Wallace and was further examined by Jeffrey Splitstoser (Splitstoser, 2014, p. 46). The group consisting of seven intact wooden batons, along with remnants of two or three others, was found in context with a burial. An adult individual was found buried nearby with several funerary gifts like round baskets, combs, and other weaving implements. These batons measure approximately 47 cm in length, with an average diameter of 4 cm. One end was pointed and slightly thicker than the other side. Only one of the batons was painted in a “gunmetal” blue colour and wrapped with pieces of textile that possibly represent the earliest known example of the use of "complementary wefts"(In a complementary-weft weave, weft yarns of contrasting colors are used in pairs, and each weft complements the action of the other exactly which forms a nice pattern). The remaining six batons were wrapped in camelid-hair yarns in a spiralled fashion, from which pendant cords were suspended, constructed using wrapping techniques and adorned with long fringes at their ends that measured up to half the length of the pendant cord (Splitstoser, 2014, p. 46).

A straight wooden core or substrate was used for the construction of Paracas batons. These then served as a base for the later wrapping and pendant cords. Splitstoser suggests that the segmented distribution of elements in the wrapped batons probably conveyed information in discrete modules (Splitstoser, 2014, p. 64). Like a Khipu, they could have also featured initial segments. These segments probably came in the shape of wrappings on the baton or primary attachment cord, which may have been meant to be read before the pendant cords. Some Inka Khipus, were attached to wooden bars or suspended from wooden batons and both Wari and Inka Khipus were rolled up when in storage and ease of transport. The shape of these rolled up Khipus would have fit easily into the hand like a baton (Conklin, 1982, p. 264). The wrapped batons shared structural similarities with Khipus and possibly can be viewed as precursors to these more advanced systems of record-keeping (Cheek, 2020, p. 20).

Staffs were symbols of authority and power in Peru and are widely documented in artwork across various mediums since the middle of the Early Horizon Period (Salomon & Nino-Murcia, 2011, p. 77). Wrapped batons may have been a more practical format for transportation than longer staffs, with early Paracas artwork suggesting their existence as almost as ancient as the longer staff or perhaps coequal with it (Cheek, 2020, p. 20). Similar to Khipus, it is possible that the Paracas wrapped batons contained encoded information that could be deciphered by someone familiar with the system.

3.6 The Emergence of the Khipu

In the Middle Horizon Period we first find evidence of knotted cord devices we can unambiguously call Khipu. Although as Brokaw mentions, this evidence does not mean that the Khipu was invented in this Period (Brokaw, 2010, p. 72). The sudden appearance of the Khipu in the Middle Horizon Period seems

to coincide with changes in socioeconomic and political institutions. These changes gave rise to more favourable conditions for preservation. The Tiwanaku, Wari and Chimu cultures dominated this Period in Peru and Northern Chile and their development and adaptation of complex Semiotic practices of their predecessors into their own societies mark the beginning of a more recognizable pan Andean style of record keeping. In this part we will focus on these three cultures, with emphasis on the Chimu and especially the Wari cultures and their development and use of different media. Both the Chimu and Wari cultures developed systems to deal with the need for storage, distribution and administration within their respective realms. The principles of the practices they developed, although different, exhibit certain structural affinities and similarities with the Khipu and the device that is thought to be used in conjunction with the Khipu, the Yupana (Brokaw, 2010, p. 72)

3.7 Wari

The earliest devices which we can definitively call Khipus, were created by the Wari civilization located in the mountains of Peru. The Wari culture originated in the Ayacucho Basin in Peru around 600 AD. Over time, it expanded to encompass a significant portion of coastal and highland Peru. The empire persisted for approximately 500 years until its eventual decline in 1100 CE. Although often referred to as an empire, there is still much debate on the subject with some scholars suggesting that a network of polities with loose economic ties is a better way to describe Wari society. Others claim that by building a network of roadways that linked these polities, as well as the construction of complex cultural and religious centres, is evidence of a more centralized political entity like the Inka (Isbell & Schreiber, 1978).

Menzel argues that during the Middle Horizon period, the art of the early Wari was heavily influenced by the art and culture of the Nazca culture. The Wari viewed the Nazca as a "high culture" that held significant value and importance, akin to an ancestor culture (Menzel, 1964, pp. 66-67). Wari textiles show a close resemblance to the textiles of the late Nazca. The interaction the Wari had with the South Coast region probably facilitated an exchange of crucial ideas and technologies as well as the documented exchange of goods, iconographic schemes, and cultural preferences. This influence is important in examining the transmission of textile writing technologies from the Nazca to the Wari.

The first Wari Khipus were found by Yoshitaro Amano in 1968 at Pampa Blanca, which is a near the Hacienda Huayuri in Pampa de Nasca, Peru. The Khipu were found in association with a burial lot containing Wari pottery and a Wari mummy. The pottery found at this burial was dated to the Middle Horizon Wari, suggesting a date of around 700 CE. This puts them about 700 years earlier than the Inka Khipus (Conklin, 1982, p. 267).

Wari Khipus stand out due to their bright and colourful yarns that include both natural and dyed fibres, they are the most colourful of all Khipu variants we have, this perhaps reflects a connection with earlier colour-wrapping practices like the Paracas batons. The Khipus come in several variations of colours and patterns including in monochrome, barber-pole, mottled, or segmented patterns. Both Wari and Inka Khipus use natural colours by the use of camelid fibre and cotton but Wari Khipus are more likely to also use dyed fibres. Most Wari Khipus have wrapped pendant cords, a feature reminiscent of other thread wrapping practices in the Andes but that is almost never found in Inka Khipus (Conklin, 1982, p. 267). Overhand knots are frequently placed near the attachments of the cords, which typically have a Z ply. While the cords vary in length and diameter, the wrapping patterns and knotting techniques are consistent, indicating that there were standards used in the construction and use of Khipus and specialists who shared these values. Because there are no first-hand accounts of the Wari people and their Khipus, unlike with the later Inka we have no Spanish chroniclers for first-hand accounts, we must rely on our knowledge of Inka and later Khipus to understand how they were made and used (Conklin, 1982, p. 267).

The Wari Khipu comes in three distinct variants: loop and branch, pendant, and wrapped main cord. Loop and branch Khipus have pendant cords that are connected directly to a loop made of a separate cord. Pendants function similarly to Inka Khipus, but they use a much thicker main cord. Some Wari Khipus have main cord wrapping. These Khipus have primary cords with wrapping in the spaces separating clusters of pendant cords. A loop made from an extension of the main cord is typically the start for both the pendant and wrapped-main-cord varieties of Khipu. All in all the Wari Khipus exhibit many similarities to the Inka Khipus although they are less complex (Conklin, 1982, p. 271). The thread wrapping visually and conceptually connects them to previous forms of textile notation, such as wrapped batons and staffs, which also employed thread wrapping to store information. This feature suggests that Wari Khipus occupied a transitional phase between wrapped sticks as specialized weaving tools and the subsequent Inka multi-purpose recording devices (Cheek, 2020, p. 13).

We know very little about the Wari Khipu numerical system. Wari knots are, like mentioned before, always overhand Z plied unlike Inka Khipus, where a knot type like the overhand knot, figure-8 knot, and long knot and their respective position on a cord determine its value. The knots on Wari Khipus can be single, double or even sometimes triple plied and are tied closely to the parent cord. The number of knots tied on cords gives us a clue on the numerical system used by the Wari. In most cases these numbers do not exceed 10, thus indicating a base 10 system. A significant portion however only has one knot present or not, indicating a binary system (Conklin, 1982)

3.8 A Short Summary:

The possible earliest form of a Khipu was found by Ruth Shady and belonged to the Caral/Norte Chico culture. This culture thrived on the North Coast of Peru around 3700 BCE to 1800 BCE. Although this find is controversial. The Chavín culture, which thrived in the northern highlands of Peru between 900 and 200 BCE, is where we find the first development op complex textile art that in the basis uses the same techniques that were later used to develop textile based information storage media such as the Khipu. The next development can be found at the Paracas culture and their Paracas Batons. Their significance as evidence of textile information tools in the ancient Andean region is hard to deny, the way thread wrapping is used suggests a complex system for information storage and is highly suggestive as a precursor to the Khipu. The earliest evidence for a "true" Khipu like device is found in the Middle Horizon period with the emergence of the Wari culture. Although the Wari Khipu were a lot smaller and less complex still the construction methods and techniques for making them are almost identical to the Inka Khipu.

Conclusion

The Khipu has been the subject of extensive research to decipher its function and meaning. Scholars have made significant progress in understanding certain aspects of the Khipu, but many questions remain. In this thesis I have focused mainly on the question: where did the Khipu come from? And I have tried, through a chronological narrative to gain some insight into the history of the Khipu. The link between Khipus and other forms of media in Andean cultures has not been the focus of much research, but in recent years we have seen some inroads into the subject. Scholars like Galen Brokaw, Jeffrey Quilter and Frank Salomon have explored connections with pottery, textiles, architecture, and oral traditions. These investigations aim to understand the broader cultural context and potential interactions between different forms of media. For example, researchers have identified similarities between patterns found on Khipus and those on textiles, like those of the Paracas and Nazca cultures, indicating the possibility of shared symbolic systems or design motifs. These textile-based writing systems of information storage and exchange seem to be interrelated in the Pre-Columbian world. Included in these systems were planning and weaving techniques as integral parts that return again and again. These systems included integral aspects of planning. What is clear in my opinion is that the Khipu and the broader tradition of textile writing in the Andes were adapted and developed over a period of at least 2,000 years in response to social, economic, and political pressures. The transition from the complex weaving aids of the Chavín and Paracas cultures to more generalized information carriers, as exemplified by the Inca and possibly the Wari empires, was a gradual process. The development and preservation of Khipus likely coincided with the emergence of state-level modes of socio-political administration and control.

In answer to the questions what is a Khipu, what how was it used and what was it used for I have tried to give an oversight on the current state of research and the going theories on the basic structure of a Khipu. Current research on Khipus involves various approaches. Some researchers focus on unraveling the numerical and accounting aspects, suggesting that Khipus were used as a form of record-keeping and data storage. Others like Sabine Hyland investigate the possible narrative or linguistic elements encoded in the cords, attempting to unveil a form of written or spoken language. She has explored the potential for Khipus to serve as mnemonic devices, aiding in the recitation and transmission of cultural knowledge and narratives. These approaches are not mutually exclusive and the going theory is that Khipus were used in both ways.

Overall, while progress has been made in understanding the function of Khipus and exploring connections with other forms of media in Andean cultures, there is still much more to uncover. Continued research, interdisciplinary collaboration, and innovative methodologies are crucial for unraveling the complexities of the Khipu and its relationship to other cultural media.

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Figure 1: Inka Khipu (Fiber Recording Device). Artstor Digital Library. Accessed Dec. 6th, 2021.

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Figure 2: Cord schematic, showing all different cord types. In Ascher and Ascher (1997).

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Figure 3: Knot Types. In Ascher and Ascher (1997).

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Figure 4: Middle Horizon horizontal Loom. In Conklin (1982).

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Figure 5: Caral Khipu. Ancient Wisdom website. Accessed Feb. 10th, 2023.

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