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## **Tracing Intricate Thread Control Systems: The Bamboo Drum or Swine Basket**

### **Loom to the TC-1**

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I use the word “primitive” with great care and caution and a certain humility for we now send men and women into space clad in triaxially woven fabrics which stem from a basic hexagonal basket structure perfected eons ago by some “primitive” Chinese artisan. I am consistently amazed by the extraordinary accomplishments of our common ancestors.

Man’s need to adorn his or her body with imagery which acts as a signifier of status or aesthetic is a time honored tradition. The transference of this imagery onto textiles was a natural occurrence, once the need for garments was established - either through protection from the elements or the arrival of missionaries....bare breasts and buttocks were verboten!

The TC-1 or thread control system developed in Norway is the perfect “sample” loom for designing contemporary complex textiles. Utilizing the latest computer technology in terms of scanning, adjusting color, form and design, the loom is warped one time only and can be utilized to create any number of varying weave structures. Each thread - up to 3520 - can be programmed to move independently.

Tracing the history of the “thinking” behind this loom back to antiquity, I propose to focus on the bamboo cage or swine basket loom still in use in some parts of Guangxi province in China. In the Zhuang culture, a young woman’s dowry is not complete without the colorful and durable brocade quilt woven on this loom. Continuing to use the back for tension, the loom is a simple trapezoidal frame with two treadles. The size of the “swine basket” (pigs are still transported in a similarly constructed basket) determines the complexity of the brocade. The bigger, the better!

The obvious next step in the creation of complex woven surfaces was the use of the drawboy and then the cut cards of the jacquard system - the precursor to today’s computer. Completing this cycle is the TC-1 which I will discuss in detail.

SO - how did we get here from there and perhaps most importantly, why did we bother to put all this time and energy into doing so?

Textiles are so pervasive and so much a part of our lives that we never stop to think much about them. However, take away the textile and one soon begins to understand the tremendous impact the loss would have on each one of us....we will not discuss whether that impact is positive or negative, we will just presume that there would be an impact!

becoming colder. If we have one, we reach for a grass or straw based plaited mat, a large leaf, a hide, an animal skin or we simply cuddle up to the person next to us and closer to the open fire. Whatever decoration we have, we have applied directly to our bodies - a pattern anywhere which somehow sets us apart from the rest of our peers. Perhaps we wear a chain of some sort, made of rawhide or plaited or braided grasses which acts as an amulet or fetish.....some small symbol which sets us apart from the group and makes us feel "special" - not totally unlike what I call the "Bloomingdale high".

The basket is believed to have been the first textile woven by man or woman. A wondrous treasure trove of grapes, berries, etc. has been found. How does one transport the harvest back to the clan? A large leaf? An over/under structure woven on the spot from available materials? Later, baskets which took years to construct were made and handed down from generation to generation as dowry items.

Obviously, man looked to nature for ideas. This particular bird's nest was constructed very near a handweaving supply house. Scraps of yarns and feathers from the nearby chicken coop were used by an enterprising bird to build a most comfortable nest. The Frank Gehry of the avian class. Using the Claes Oldenburg metaphor, "big is better", man then took the basket form and built a dwelling. I show you here the artist, John McQueen's work accomplished during a residency at the Brookfield Craft Center in Connecticut.

The second "textile" is felt - wool and hair based, felt is called the "poor man's carpet" in the middle east and India. In the good, old, time honored tradition of "keeping up with the Joneses", as soon as you can afford to do so, you cover your glorious felt with a pile woven carpet. To make felt is quite simple - heat, cold or shocking the fibers and constant pummeling will result in a felted surface. Nowadays, you can simply throw a wet wool whatever into the dryer at a hot heat setting and voila - a sweater fit for Barbie! ....or part of Charles LeDray's artistic output.

Primitive peoples probably felted the surface of their hide coverings without even considering the possibility of doing so and then some bright person took a sharpened stone and peeled the felted surface away from the hide below. Felt is exceedingly warm and waterproof due to the lanolin innate in the animal fleece. At this point, humans have invented two textile structures: the basket and felt.

If we agree that the first priests or shamans were those fortunate people who could draw the magical images at Lascaux and Altamira, then it naturally follows that these people would have needed some sort of apparel or accouterments which set them apart from the "hoi poloi" as it were. Like the samurai helmets or the African chief's caps, some sort of accouterment which would set him or her apart...some Cher-like adornment. The scarification patterns of Africa, the tattoos of the Japanese yakuza, the New Zealand Maori, and India's tribal peoples are all replicated in the later surfaces of woven or printed textiles. Body decoration pre-dates the decoration of fabric used for body

decoration and - at least in the beginning - replicates the decoration or patterning used in body painting and scarification.

According to Elizabeth Barber in Prehistoric Textiles, we have evidence that looms used to weave fabrics were in use in the Neolithic period. However, since textiles do not survive unless frozen as at Pazaryk or in a desert environment as in Peru, we have no real basis as to dates for the first looms. Spun yarns which provided the lengths of yarns needed for on-loom weaving certainly pre-dates the Neolithic period. We should note here that contrary to public opinion, spiders do not “spin” a web. They extrude - just as we now do - a single continuous filament - monofilament as it were. Humans spin and manage to turn short, weak fibers into long, strong yarns and ropes by simply twisting them together. Duke University’s Professor Steven Vogel states: “Even though their fibers are not joined end to end, these ropes are remarkably strong. The fibers are kept from pulling apart by their resistance to shearing or sliding across one another when they are compressed. Pulling on a spun thread or a twisted rope has the same effect as shearing a structure; it presses together the fibers in the middle.....This tension induced compression is especially obvious with fluffy yarn.”

Back to Ms. Barber who quotes Leakey: “Recent ethnographic studies suggest that as nomadic hunter-gatherers settle down today and become crop-raisers, and no longer need to carry anything and everything they choose to own, they radically shift their time/energy values toward stockpiling and possession.....the “Bloomingdale high again or I am what I own! These changes make it worthwhile to invest more time making things - i.e., to develop various crafts. So perhaps the apparent explosion of crafts at the beginning of the Neolithic is not merely an illusion born of how we retrieve artifacts.”

In order to weave cloth, one needs the basic equipment and materials to create at least two opposing sheds - one up and one down.....and time - lots of time. Human need and ingenuity simply built on the basics from this point forward. Backstrap tensioned weavings from many different cultures were initially single layer woven sometimes with a pattern dyed into the warp or weft or both - a compound ikat process. Then, pick-up patterns initiated the dawn of the intricate thread control systems in use today. In the line of progression and invention from the basic back strap tensioned pick up weave structures to the computer generated digital weaving of the TC-1, we encounter the swine basket loom of the Zhuang peoples which is still in use today in the province of Guangxi in southern China. Ulla Cyrus - Zetterstrom of Stockholm, Sweden has done very extensive research on this loom and with her permission, I want to share her slides with you as well as an edited translation of her research which I did with the able assistance of Vibeke Vestby of Oslo, Norway, the inventor of the TC-1 loom.

The following is a brief synopsis of the swine basket or bamboo drum looms of China: The Zhuang people have an ancient and much respected reputation for fine craftsmanship. In addition to mural paintings, bronze drums and silver jewelry, the female Zhuang are renowned for their superb and intricate weavings. In addition to the weavings, the women dye cotton cloth with indigo, patterning the surface with resist techniques including batik

dye cotton cloth with indigo, patterning the surface with resist techniques including batik (wax) and plangi (tie or stitch resist). Ikat, which involves the tying and dyeing of patterns into the fiber prior to weaving, is also practiced among the Zhuang. Embroidery techniques are employed to decorate the surfaces of shoes as well as scarves and other household items. The special fame of the Zhuang women comes from the renowned zhuang silk named "zhuangjin". The term "jin" appears in Chinese classical literature and means weaving, usually of silk, patterned with multiple colours. These silks were woven on the bamboo drum looms.

The young girls had to learn how to weave before they could marry. A blanket or coverlet of handwoven "jin" had to be part of the dowry. It was strong and long lasting and woven with many colors. It is impossible to determine when the loom was invented. According to local stories, the earliest looms with bamboo drums existed in the Guangxi province, where their use spread from Xincheng to Jingxi and onwards to all parts of Guangxi. There is no doubt that the loom is more than 300 years old.

The Zhuang loom is constructed of wood and bamboo. Due to the fact that the shed mechanism for patterning resembles a swine basket, it was earlier named the "swine basket" loom. Swine "ZHU" and bamboo "ZHU" are pronounced the same way in Chinese and one may still see live pigs transported from farm to market in similar baskets.

The loom has a frame but it is nevertheless, the same as a backstrap loom. This means that the warp is not tensioned until the weaver is seated in the loom and connects the fabric beam to the belt which passes around her back. Using a simple rod system which is wound onto the swine basket, a given warp pick up pattern is woven. The transition from this system, continuing to use the backstrap for warp tension to the drawboy, handpicking each group of threads, is quite clear. According to Linda Lynton, "It is unclear whether drawloom technology developed independently in Persia or came out of China. Loom figured silks were first developed in pre-Han Dynasty China (206 B.C. - A.D. 220) and the mechanical loom patterning which produces weft faced compound weaves seems to have appeared in both Persia and China about the same time; however, it is important to remember that Persia was a pivotal link in the silk trade route to the West."

Let's now move on to Monsieur Jacquard and his invention in France. In the jacquard system, the threads are lifted and lowered by the use of cut cards which are strung together and cascade down the side of the loom. I liken this mechanism and the dobby mechanism to a music box - the engaging or non-engaging of pegs used to create a complex patterning system.

Last but not least is the TC-1. Using shaft based design or digitized images, one can replicate any imagery on this system and up to 3250 threads may be programmed to move individually. The graphic possibilities are truly infinite. Here I show you the loom in my

studio in Jersey City and here an image which was scanned into the computer, digitized and woven.

In closing I would like to quote from Mildred Constantine who, as a curator at the Museum of Modern Art, helped to create their collection of contemporary fiber art. To end her splendid new book entitled Whole Cloth, Ms. Constantine states: "When we conceived this book over a decade ago we predicted that cloth would bind artists from the art fabric movement to those working in the more traditional fine arts. By publication time the book has become a historic record of the breaking down of all categories in art as mixed media and installation have invaded every aspect of contemporary art. Indeed, the use of cloth in works of art is not a movement but an all pervasive trend adopted by artists of every cut and color. Sometimes, cloth is the entire work of art, sometimes a component or a fragment. However, just as thread is assumed into material, cloth has been assumed into the fabric of twentieth century art."

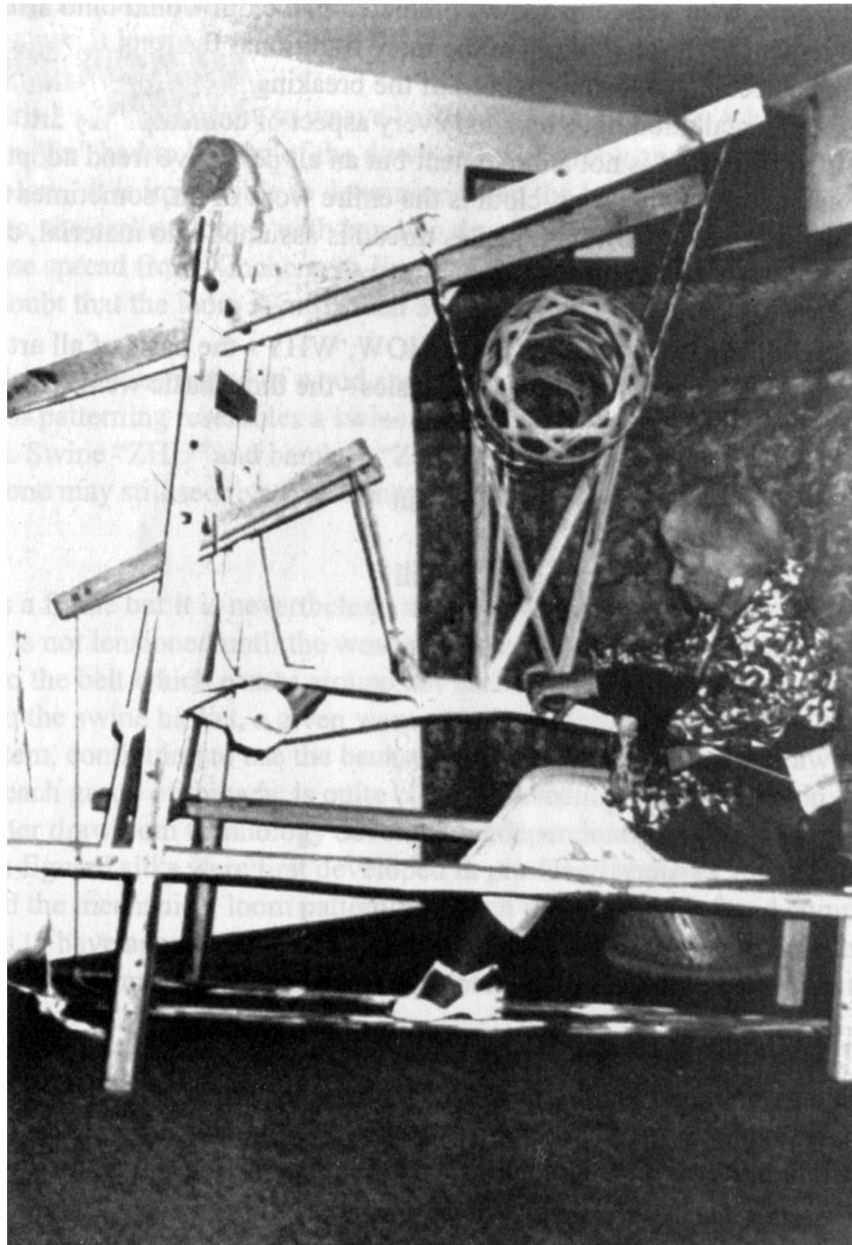
I end with slides of my latest work, WHAT, HOW, WHY - the basis of all art criticism - weft overshot in neon tubing and "Back to Basics - the three basic weave structures known to man from time immemorial:

plain

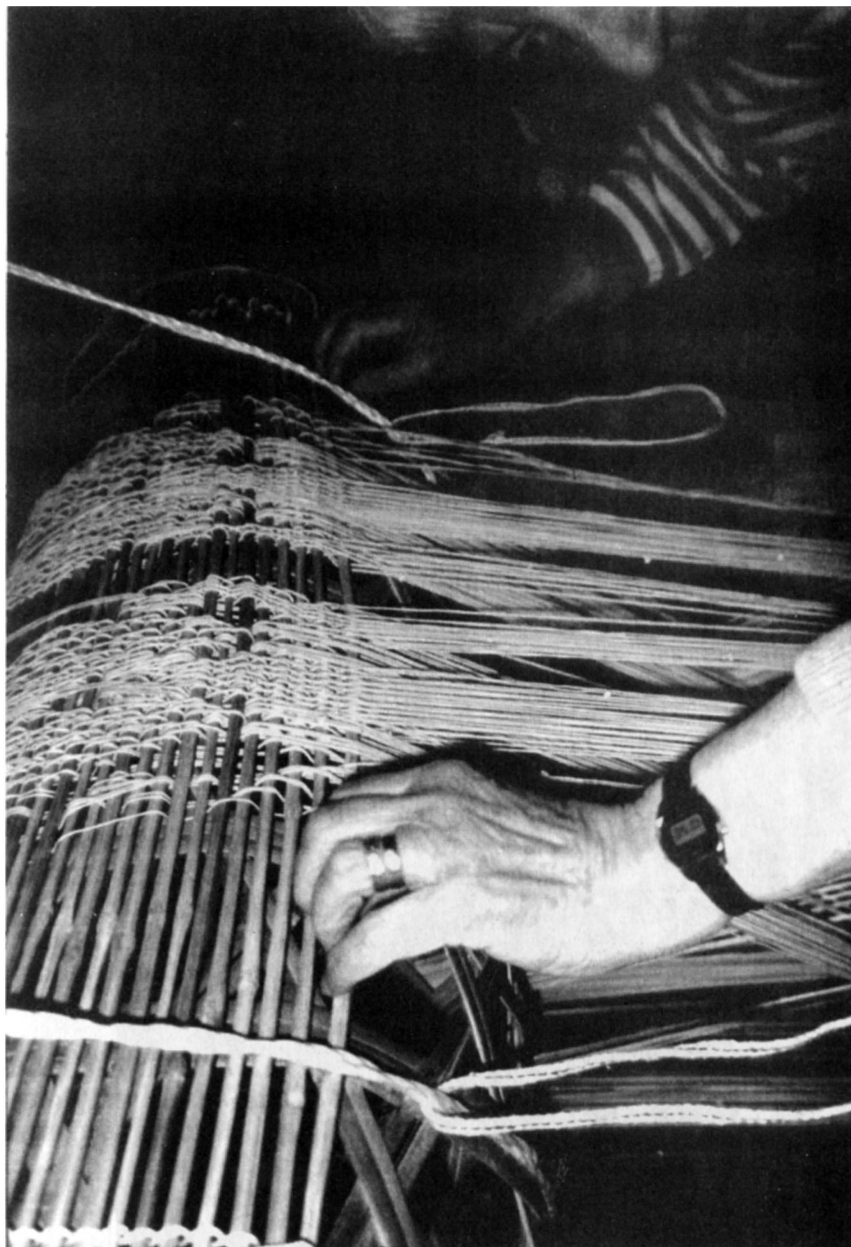
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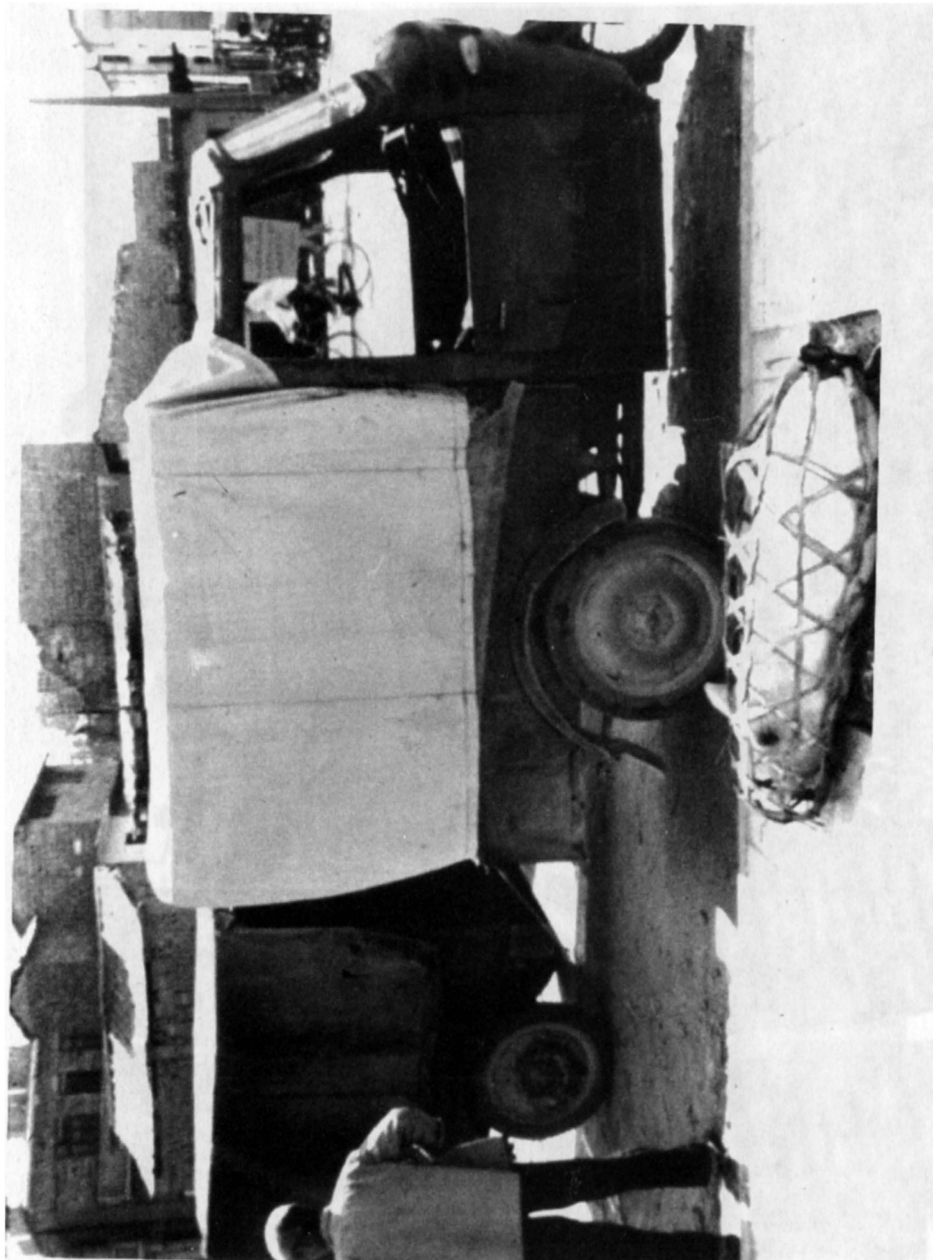


Ulla Cyrus Zetterstrom weaving on the bamboo drum loom from China.



Ulla Cyrus Zetterstrom removing a pattern rod from the bamboo drum loom. Each rod holds one pick of the pattern in the "zhuangjin" weavings.





Pig in a swine basket enroute to the market in China.



Donna Lish weaving on the TC-1 loom from Norway.

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