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A Mao A minute Real Computers as Virtual Weavers

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A Mao a Minute

In the mid-1970s, Chinese goods began to flood American markets as a result of President Richard Nixon's historic visit to China in February 1972. Among such trade items as blue Mao jackets and caps with red enameled stars, proletarian black cloth shoes, and little red books were photograph-like woven portraits of the potentates of Communism: Stalin, Lenin, Marx, and Chairman Mao.

Convinced that China had computer-and-loom systems that could instantly weave textile renditions of photographs, I raced off to the textile industry in New York City to weave on these digital wonders. Industry experts quickly disabused me of this idea. If New York didn't have such a sophisticated computer system at that point in time, neither would China.

Twenty years later, in 1995, I visited one of the factories in China where they manufacture woven pictures. We watched a technician as he translated an image into instructions for a jacquard weaving, painstakingly hand painting a point paper – one tiny rectangle at a time. No Mao A Minute.

Over the years, I attempted to simulate virtual computer-and-loom systems. In the 1970s I used a pencil to translate the gray values of a video image printout into shaded satin weave structures. In the 1980s I used a 128K Macintosh computer and a software package[2] to convert video signal into shaded weaves. What was missing, of course, was the link to the loom.

In 1999, I worked with Louise Bérubé at her workshop on computerized weaving at the Montréal Center for Contemporary Textiles. Using *Pointcarré* software and an AVL loom with a TIS computerized jacquard head, I was finally able to weave a pair of

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1. Virtual: a word that has become part of the lexicon of computer terminology meaning an intangible simulation or emulation of the characteristics and nature of something that is real and tangible.

2. The out-of-date software program I used was MAGIC (MAcintosh Graphics Input Controller) by New Image Technology. See Lisa Lee Peterson, "From Image to Woven Structure: A Video-Computer System for Textile Designers," *Ars Textrina* 7 (1987), 109-160.

photographs using a computer-and-loom system that I had envisioned a quarter of a century earlier.

Friends and colleagues were skeptical about the major role the computer played in the creation of these pieces. "That's cheating!" they said, dismissing the fact that there was a real human weaver behind the virtual computer weaver.

Their reaction raises a legitimate philosophical issue that is the focus of this paper. Although I physically wove the pieces - stepping on the treadle, tossing the shuttles, and beating the weft - the pieces could have been woven entirely by a computer-controlled mechanized loom.

Do time and human hands determine the value of woven textile art? Is it "cheating" to enlist the aid of a computer and a computer-assisted loom? If a significant part of the aura and mystery of a woven object are the hours and skills invested in its making, does the speed of execution diminish the object's inherent value? Is a Mao a Minute less valued, less venerated than a Mao a hundred hours?

Looms and computers, a shared history

Throughout history, humans have employed tools to assist them in their work. In the history of hand loom technology, the simplest of looms has the greatest potential for immediate variation because weavers may vary the patterns and weave structures as they weave. The more complex the loom, the opportunities for spontaneous variation diminish; most of the work occurs during the set up of the loom, long before the fabric is woven.

The drawloom, before the mid-19th century, was a highly complex machine that, once set-up, could usually weave only one pattern. However, once the loom was set up, the loom could weave the identical pattern over and over – a distinct advantage when weaving repeat yardage. The drawloom had two operators who manipulated two sets of harnesses: the weaver used treadles to control the front harness that determined the basic structure of the woven cloth; and the drawboy, perched above or sitting beside the loom, controlled the back harness by pulling pre-tied cords that established the pattern of the woven fabric. The tie-up for a complex pattern took two or more months, during which time the loom sat idle.[3] When completed, the loom would literally be tied up: it could only weave that one pattern until the draw cord ties were dismantled and a new pattern tied in.

Before the development of the Jacquard loom attachment, inventors designed various improvements to overcome the limitation of one pattern to one loom. In the 18th century, Philippe de LaSalle designed a tie-up system that was interchangeable with other tie-ups. Another variation was the métier à la grande tirer – a drawloom with a long side extension that housed tie-ups for as many as twenty different patterns that could be used successively.

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3. Daryl M. Hafter, "New looms and fabric novelties in Philippe de LaSalle's 18th century silks," in *Irene Emery Roundtable of Museum Textiles, 1977 Proceedings: Looms and Their Products*, edited by Irene Emery and Patricia L. Fiske (Washington, DC: The Textile Museum, 1979), 259.

In 1804, Joseph-Marie Jacquard developed a punch-card operated mechanism to replace the cumbersome drawloom tie-up.[4] A loom with the Jacquard mechanism attached to the top was no longer restricted to weave one pattern. To change the pattern, the weaver simply exchanged sets of cards.

Charles Babbage's theories for an Analytical Engine – based on the Jacquard's punch card system – were first published in 1842. Weaving is inherently a binary construction: either a warp thread is up, or it is down. A hole in a punch card causes its corresponding warp thread to rise; no hole means that the corresponding warp thread will not rise. Babbage saw in the punch cards the potential of the binary system for data calculation, storage, and transmission that is the basic building block of electronic code and the computer. One of Babbage's admirers remarked, "The Analytical Engine weaves Algebraical patterns, just as the Jacquard-loom weaves flowers and leaves . . ."[5]

Conversion of the design into point paper and then to a set of punch-card instructions for the Jacquard, is the work of highly skilled technicians and often requires hundreds of hours of work.

The point paper technician who worked at the Boris Kroll Fabrics (where I worked for five years) received intensive training in the art of point paper design in pre-World War II Europe. Aware that Boris Kroll's point paper technician was one of a dying breed – no one else was trained or willing to be trained to carry on such meticulous work, I tried to catalog the vast library of weave structures that he held in his mind. As this was the mid-1970s, I did not have a computer to assist me in this task. But in this aspect the powerful computers of today are invaluable memory devices, racing to record and preserve the mental processes involved in point paper design before the last of the highly-trained technicians is gone.

Both the drawloom and the Jacquard were developed in response to the demand for figured fabrics that could be woven as yardage in identical repeats. Because of the large expense in setting up a drawloom, only the aristocracy could afford drawloom-woven figured fabrics for their clothing and interior furnishings. The Jacquard made figure-woven fabrics more affordable, but the large investment in the point paper and card cutting preparation still requires the manufacturer to mass produce a pattern in order to recover the costs of producing it.

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4. Jacquard's device succeeded in bringing together the drawloom improvements of other 18th C. inventors, among them: Bouchon (1725) designed a mechanism for selecting drawcords using needles and perforated paper; Falcon (1934) substituted punched cards stitched together; Vaucanson (1745) applied the idea of the punch cards and needles to raise warp threads. Philip Morrison and Emily Morrison, eds., "History of Punch Cards" in *Charles Babbage On the Principles and Development of the Calculator*, (New York: Dover, 1961), xxxiv, and *The Encyclopedia Britannica.*

5. Charles Babbage's admirer and chief supporter was the mathematician Ada Augusta, Countess of Lovelace. Babbage never built a punched-card calculating machine, but Herman Hollerith, the inventor, patentee, and co-founder of the earliest punched card tabulating machine may have been influenced by Babbage's published report of 1878; more probably Hollerith took his ideas directly from the Jacquard loom. By 1890 crude Hollerith machines were in practical use at the U.S. Census Bureau. Morrison, *Charles Babbage*, xxxiii-xxxv.

Until the computer had a role to play in the conversion of a design to woven fabric, creating one-of-a kind Jacquard-woven textiles was economically impractical.

Computerized jacquard: the virtual weaver

Nearly two centuries after the punch-card operated Jacquard inspired the invention of the first computers, computer technology has finally returned to assist the weaver. Textile software, such as *Pointcarré*, allows the designer to convert a textile design or image into instructions to operate the loom in a matter of a few hours. The software – as virtual point paper designer and virtual card cutter – emulates both of these processes, storing all of the information as electronic data on a computer disk.

The weaver inserts the disk into a computer-controlled loom, such as the French TIS Jacquard attachment for the AVL hand loom or the Norwegian Thread Controller TC-1, taps a few instructions into the computer, and weaves.

The near-instantaneous and relatively low cost of converting a design to loom-control instructions makes possible the creation of one-of-a-kind Jacquard-woven art objects. The weaver can easily produce identical computerized jacquard-woven multiples and, like the printmaker, might choose to limit editions to create market value by false scarcity.

But is the market willing to accept computer-assisted textiles as legitimate art? The computer as virtual weaver challenges the boundaries that define weaving as an artform. If a Mao a Minute eliminates the touch of the human hand is it still art?

Art v. Craft

Textile artists, indeed all artists who work in traditional craft media, have a tenuous footing in today's elitist world of art. In a recent review of a fiber exhibition in Albuquerque, the reviewer wrote

Her weaving . . . reminds me of the aesthetic and political transition that textiles made 30 years ago when they were reborn as fiber arts. Without that redefinition, I would now be reviewing a crafts show.[6]

The British potter Bernard Leach, writing in the 1970s, placed functional craft in a status higher than non-functional art.

Handcraftsmanship . . . justifies itself . . . as an intimate expression of the spirit of man. . . . If . . . it ceases to serve a functional need, it runs the risk of becoming art for art's sake . . .[7]

I prefer the inclusive viewpoint of Henry Glassie, professor of folklore at Indiana University and author of *The Spirit of Folk Art*,[8] a magnificent volume about the Alexander Girard collection at the Museum of International Folk Art, just up the hill here in Santa Fe. Writing about Turkish art, Glassie eloquently defuses the debate over art versus craft.

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6. Wesley Pulkka, "Fiber arts exhibition features solid craftsmanship," *The Albuquerque Sunday Journal* (30 July 2000).

7. Bernard Leach, introduction to *The Unknown Craftsman*, by Soetsu Yanagi (Tokyo: Kodansha, 1972), 97.

8. Henry Glassie, *The Spirit of Folk Art: the Girard collection at the Museum of International Folk Art* (New York: Abrams, 1989).

The Turkish word for art is sanat. *The artisans contrast it with* emek. *Their distinction between* sanat *and* emek *is analogous to our division of art and craft, but the criteria differ. We try to separate art from craft by medium, assuming some deep, even universal validity in the conventional hierarchy of the late West, as though a textile or ceramic work, no matter how fine, can only be craft, while a painting or sculpture, no matter how dreadful, remains art. . . .*
*[*Sanat *and* emek *are both] created to make a living. . . . but [*sanat*] is distinct in that it contains . . . the artist's gift suffuse[d] . . . with spirit. . . .*[9]

Hand v. Machine

One might apply Glassie's perspective to the discussion of whether or not an object is real art if a virtual computer weaver played a role in its creation: art is the spirit of its human maker and not the tools, virtual or otherwise, that made it.
Weavers are no strangers to machines. As the inspiration for the first computer, weaving, among all the craft media, is most closely related to the computer. Yet our fellow craftsmen and possibly those who judge, buy, and appreciate crafts would disparage the virtual-computer-weaver-assisted textile as something less than the 100% real human hand-made article.

Soetsu Yanagi, founder of the Japan Folkcraft Museum in the 1930s, wrote about the place of crafts in the industrialized world of mass-produced objects in his book, *The Unknown Craftsman*. It is perhaps his writings that continue to exert their influence on our sensibilities and expectations of the craft media today.
. . . The chief characteristic of handcrafts is that they maintain . . . a direct link to the human heart. Machine-made things are children of the brain; they are not very human. . .

No machine can compare with a man's hands. Machinery gives speed, power, complete uniformity, and precision, but it cannot give creativity, adaptability, freedom, heterogeneity. . . . Man prefers the creative and the free to the fixed and standardized.[10]

However, Yanagi was open to the idea of the machine-made object, commending the work of William Morris of the Arts and Crafts movement at the dawn of the 20th century and of mid-20th century industrial designers Charles and Ray Eames.
. . . The problem is not a matter of either hand or machine, but of utilizing both. . . . [The designer] must . . . know beauty at sight; then . . . he should understand the principles of mechanics . . . yet at the same time . . . also appreciate . . . the value of handwork. . . .[11]

Yanagi was writing in a time when industry was the only choice an artist had to access the machine, when a new occupation, industrial design, opened up for the artist-craftsman. William Morris and the Arts and Crafts movement sought to correct the ills of bad design in the wake of the Industrial Revolution. When we look at his woven fabrics today, the obvious mechanical repeats seem formal and stylized.

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9. Henry Glassie, *Turkish Traditional Art Today*, exhibition catalog (Indiana University Art Museum, Bloomington, Indiana, 26 October to 23 December 1994), 4-5.
10. Yanagi (1889-1961), *The Unknown Craftsman*, 107-108.
11. Ibid., 108.

Anni Albers came to this country in the 1940s and is often cited as the founder of textile art in the United States. In her book, *On Designing*, Albers stresses the role of the artist in the work.

An impartial critic of our present civilization . . . would show that a division between art and craft, or between fine art and manufacture, has taken place under mechanical forms of production; . . . one . . . entirely spiritual and emotional . . . , the other predominantly practical . . .

Whether the result is a unique object or a mass-produced one is hardly of concern, as long as the work is approached in the submissive manner of the artist. . . . [12]

Virtual computer weavers in the hands of real human artists

The computer is a relatively new device in the weaver's basket of tools. Its presence in no way threatens to usurp the unique beauty of the hand-crafted object. The computer gives the textile artist access to the "speed, power, complete uniformity, and precision" of the Jacquard. The artist is free to explore which of these attributes to employ in the expression of her heart, free of the concerns of wearability and mass-marketability of the industrial-designed mass-produced object.

In Louise Bérubé's multi-colored warp workshop this summer, I collaborated with my husband to translate the amorphous watercolor-like effects of his paintings into weaving. I wanted to emulate the shifting and transparent feeling of his images rather than reducing it to clearly-defined solid areas of color. The facile nature of the software *Pointcarré* allowed me to weave with undefined and overlapping areas of color. To me these first pieces are small jewels, the sketches for a series of weavings of abstract imagery.

Lia Cook and her student Min Suk Kim are two artists who have enlisted the aid of computers to weave portraiture – a Mao A Minute, if you will – without sacrificing their artistic spirit to the machine.

Min Suk hard-wired the image of his California driver's license in copper: a parody of biting the computer that wove it. In an exhibition of Lia Cook's recent work of video and photographic self-portraits, one experiences an eerie sense both of watching and being watched. Loosely draped cloth images create the illusion of the moving, breathing body, yet each cloth is still: there is virtual physical presence, yet the real body is absent. The computer that assisted in the creation of all of these pieces was not the artist.

Weaving is the root of both the Industrial Revolution and the Digital Revolution. A Mao A Minute is not cheating, it is simply a harvest of the seeds we have sown. The computer as virtual weaver is just that – virtual – and not the real human weaver, not the real human spirit in the work.

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12. Anni Albers, *On Designing* (Middletown, CT: Wesleyan University Press, 1961), 13-14, 64.