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## The Computer Pays Back Its Debt to Weaving: An Alternative History of Computer Aided Design

Kayleigh C. Perkov

perkovk@uci.edu

UC Irvine, United States of America

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The concept of craft is being radically reshaped by the rise of computer aided design (CAD) technology, particularly following the emergence of 3-D printing and laser etching. Exhibitions such *40 under 40: Craft Futures* (2013) and *WONDER* (2016) at the Smithsonian's Renwick Gallery, *Crafted: Objects in Flux* (2015) at the Museum of Fine Arts, Boston, and *Manus x Machina: Fashion in an Age of Technology* (2016) at the Metropolitan Museum of Art offer an extensive view of how technology has fully infiltrated studio craft practice. Despite the enthusiastic display of such practice, there is a clear rift in the field over what implications the use of these tools have for craft as a discipline. This changing discourse is especially volatile around "skill," as technological tools broaden the ability of individuals to create objects without traditional training in handmaking techniques. Emblematic of this tension is Renwick curator Nicholas Bell contention that "objects come into being through process, and process is delineated by skill. Thus the skilled hand, not the mind, defines the materiality of the final object. If we are no longer compelled to make things by hand—if we chose instead to upload designs into a machine that will make all of those things for us (however much training this demands)—the design determines the final object and we divest ourselves of the skills required to relate to the world at the most primal level" (Bell, 2013).

This paper historicizes the landscape of digital technology and craft practice through an examination of International Business Machines (IBM) computer programmer and weaver Janice Lourie, who in the mid-1960s developed and patented computer assisted design (CAD) software for mechanical looms, which she termed "textile graphics." Lourie's software replaced the traditional method of manually converting a design into weaving instructions for a loom—a laborious process taking many hours and different skilled

technicians. As opposed to considering the impact of textile graphics upon "skill,"—a quality as relative as it is contentious in the field of craft—this paper instead focuses on the role of communication between maker and tool. Lourie's CAD system utilized an IBM 2250 computer monitor that allowed for manipulation of data through touching the screen with a light pen—similar to today's touch screen devices—enabling users to rapidly visualize and explore a multiplicity of different designs and weaving patterns. Some traditional views on craft and technology suggest that such tools eliminate "risk" from the process of craft, but I argue that Lourie's system invited makers to court risk, to try a variety of approaches that may not have accurately reflected their initial inspiration or highlighted the flaws of their design. Lourie envisioned textile graphics as a conversation between computer and maker, with each party providing both constraints and solutions in progress towards a final product. This feedback loop allowed for the rapid visualization of the final woven form, decreasing the cost of trying new designs (both in terms of time and materials), and allowing for near endless variation and customization. It is this conversational and iterative philosophy that separates Lourie's work from many others computer scientists of her time, and connects her work to the contemporary landscape of CAD and craft.

At the historical moment in which Lourie developed her software, modernist beliefs in the neutrality of technology were being routinely challenged in mainstream thought, driven by this shift towards increasingly diffuse modes of power, the lingering trauma of the Second World War, and the dawning realization of the atrocities of the Vietnam War. Companies such as IBM were aware of such cultural hostility, and enlisted various public relations campaigns in order to counter growing stigma. A study of Lourie subsequently offers a vantage of how computers were domesticated in the popular imagination. Lourie herself took part in this push, claiming about her software in *The New York Times* that "[i]t seemed to me that it was about time that [computing's] debt to the weaving trade was paid back ... It also seemed about time to bring a woman's touch to the computer age" (Carey, 2967). This emphasis on a woman's touch was harnessed by IBM during much of their promotion of Lourie software. For example, Lourie's technology was showcased at an IBM pavilion at the 1968 World's Fair in San Antonio (TX). One archival photo is taken from the perspective of the audience seated in low-slung bleachers, directly facing the eleven-foot-tall Jacquard loom. Flanking the Jacquard loom are two textile

graphics systems. There is something awe inspiring about this setup, the direct feed from computer to machine obfuscating the transmission of information. Mechanical looms are not quiet things; they clank and shutter as their treadles manipulate warp threads. One imagines the jarring contrast between the relatively quiet and frictionless experience of moving the light pen across the screen of a 2250, only to then meet the noise and movement of the Jacquard. The contrast must have felt extreme, the process split into clearly divided steps with little visible flow between them. And yet the end result is seemingly so benign, another archival photo shows a young IBM employee toothily grinning as she holds up her newly woven souvenir swatch bearing the design of a small daisy emblazoned with IBM's logo. IBM's exhibition used the textile graphics system to emphasize two points it wanted to make about computing technology: it allows for an unencumbered connection between designer and loom, and it is unintimidating; a small scrap of a daisy.

Despite IBM's embrace of the textile graphics system, Lourie's work actually complicates this neutral, hierarchical paradigm of technology. Instead, Lourie encourages a symbiotic approach to melding craft and technology that is far more nuanced than either a naïve belief in technological neutrality or, on the other extreme, a rejection of technological systems as a useful tool. Lourie's "conversational" and unintimidating approach to technology connected her with an important minority of crafters and technologists who embraced each others fields under the umbrella of late 1960s counterculture, and it is these people whose ideology best foreshadows current trends in personal fabrication. Activist Ted Nelson, who published *Computer Lib* (1974) as a call to arms for amateurs to learn computer skills and seize the authority of the expert, made a comparison surprisingly apt for this study: "[s]omehow the idea is abroad that computer activities are uncreative, as compared, say, with rotating clay against your fingers until it becomes a pot. This is categorically false. Computers involve imagination and creation at the highest level. Computers are an involvement you can really get into, regardless of your trip or your karma" (Nelson, 1998). This emphasis on creativity and the shift from authority to amateur are not only a key feature of larger countercultural tenants, but also the rise of the "prosumer"—a portmanteau of "producer" and "consumer" coined by Alvin Toffler—who owned professional-grade tools while eschewing professional services (Toffler, 1980). This

"prosumer" ethos connects Lourie to current movements in personal fabrication, and provides an illuminating predecessor for understanding our current moment.

## Bibliography

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