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Article abstract

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Robin Lynch

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Two nudes appeared in The Museum of Modern Art (MoMA), New York, almost ten years apart from one another, each having been produced using then-emerging scanning technologies to meticulously measure and process the human body into an image. The first, *Nude*—or *Studies in Perception I* as it was later titled—was created by Bell Labs engineers Leon Harmon and Kenneth Knowlton in 1967. From a distance, *Nude* features a reclining female body, which resembles a black-and-white soft-focus photograph. Her head is tilted back, hiding any distinguishing facial features as her ear rests upon her lower bent arm. Her other arm crosses over her chest, covering her lower breast, while the right edge of the frame crops her body at the upper thigh. Her pose, and its accessibility to the viewer's gaze, recalls many canonical nudes such as Titian's *Venus of Urbino* (1534) and Henri Matisse's *Blue Nude (Souvenir de Biskra)* (1907). Up close, however, *Nude's* reference point shifts to that of equations, technology, and systems, as the form dissipates into a plethora of mathematical and scientific symbols that at times form patterns, and at others seems to have no coherent formation. Created with the help of an early mainframe, in the scholarly literature for art history, *Nude* is frequently referred to as the first computer-made nude portrait.

The second nude, *Man-Scan* (1974), was created by artist Sonia Landy Sheridan in collaboration with Keith Smith, using the new Color in Color II scanning technologies from the 3M corporation. | **fig. 1** | *Man-Scan* consists of nine massive, full-length nude body portraits of model Ric Puls, with the largest of the works measuring 14 × 3 meters. These massive nude images showcase the new colour technology through the use of vivid, saturated hues that exaggerated the fleshy tones of Puls's skin, sometimes making the body appear bright orange and yellow, starkly outlining his figure against a teal-hued background. In most of the nudes, Puls's form is lying down with his eyes closed, and with his arms stretched above his head. Most of the frontal and portrait versions capture the entirety of Puls's body, including his exposed genitals. The nudes were made by meticulously scanning Puls's body slide-by-slide, and then assembling these into a full body portrait using hundreds of individual documents. As a result, Puls's figure is fragmented, distorting various parts of his body through either halting or extending certain areas. Sheridan had been experimenting with the machines to figure out how to transfer scans onto a variety of materials

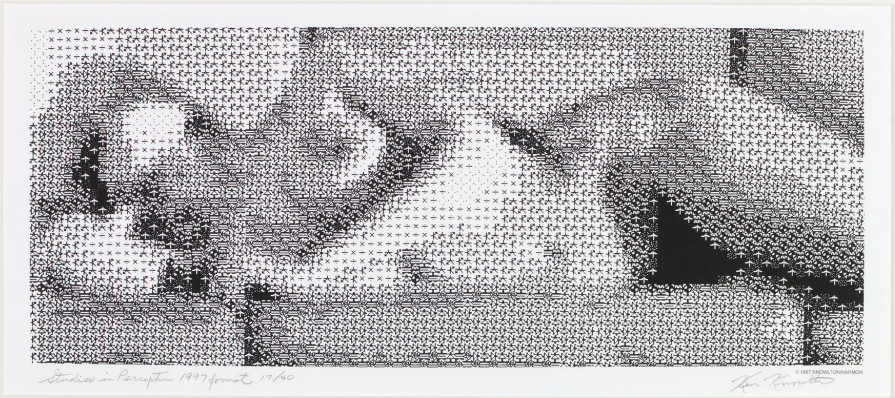

Figure 1. Leon Harmon and Kenneth Knowlton, *Studies in Perception I*, limited edition laser print of the original 1967 computer-generated image, 1997, 32 × 55.6 cm. © Victoria and Albert Museum, London.

other than paper by manipulating light and heat. Many of the nudes showcased these efforts and were ironed onto fabric or transferred onto zinc plates using techniques Sheridan had developed, adding a textural element to the portraits. The final figures represent an immense amount of work and technique.

The trajectories that led to each piece being exhibited at The MoMA began from completely opposite artistic, technological, and corporate motivations. *Nude* was initially produced as an office practical joke on Knowlton and Harmon's boss. Neither originally had the intention of circulating the nude beyond Bell Labs. Sheridan, on the other hand, began doing residencies at 3M in 1970 in hopes of bringing artistic insight into the development of new technologies. Each nude exemplifies a rendering and formatting of the human body into information through new technologies and experimental techniques developed by the creators. While both the nudes were produced using different technologies, the material processes in which they each capture and "scan" the human form speak to a set of shared concerns around the use of technology to perceive, process, and transcribe bodies into readable formats for humans. Through both their processes and sites of production, the nudes are fruitful case-studies as socially-embedded historical subjects of emerging media in the 1970s, engaged with then-nascent ideas of the so-called Information Age.[1]

The nudes emphasize a complex interchange of art and technology as the social context of the technologies becomes embedded in the construction of the nudes, and the nudes in turn—as they pass through spaces of exhibition and industry—impact the development and understanding of the scanning technologies. The consequences of the different protocols afforded to each case are evident in the respective scholarly reception for each work. In the rapidly growing art historical literature around technological art from the 1960s and 1970s, Harmon and Knowlton are frequently recognized as pivotal touchstones for contemporary media art, and for predicting some contemporary technological habits. For example, Harmon and Knowlton's *Nude* is cited multiple times in Edward Shanken's *Art and Electronic Media*, touted as prefiguring "virtual reality and the computer's ability to fool the human eye—and, eventually, other senses as well."[2] They are similarly placed in Christiane Paul's *A Companion to Digital Art*, where *Nude* and Harmon and Knowlton are cited by Charlie Gere as "important for the emergence of bitmapping, hypertext, word processing, and other phenomena connected with the rise of personal computing in the 1980s."[3]

Nude is also upheld as a beacon of cross-disciplinary practice between art and technology by scholars such as Carolyn Kane and Zabet Patterson, who both locate it as a pioneering computer artwork.[4] Their placement as canonical figures for the history of art and technology is in part a story of access, as Bell Labs would become one of the main technological access points for artists, making it a key hub for these histories as a result. Further, Knowlton was often one of the central collaborators and equipment facilitators for artists such as Lillian Schwartz and Stan VanDerBeek during their residencies at

1. Ronald Kline, *The Cybernetics Moment: Or Why We Call Our Age the Information Age* (Baltimore: Johns Hopkins University Press, 2015).

2. Edward Shanken, *Art and Electronic Media* (Phaidon Press, 2009), 27, 81.

3. Charlie Gere, "The Hauntology of the Digital Image," *A Companion to Digital Art*, ed. Christiane Paul (West Sussex: John Wiley & Sons, Ltd., 2016) 203–226.

4. Caroyln L. Kane, "Digital Art and Experimental Color Systems at Bell Laboratories, 1965–1984: Restoring Interdisciplinary Innovations to Media History," *Leonardo* 43, no. 1 (2010): 53–58. Zabet Patterson, "Studies in Perception," in *Peripheral Vision: Bell Labs, the S-C 4020, and the Origins of Computer Art* (Cambridge, MA: MIT Press, 2015), 46.

the Labs. This begins to highlight some of the differences in mobility inherent in industry and art partnerships during the 1960s and 1970s, when technologies such as computers and scanners were not widely available to the public. Knowlton and Harmon had complete access to these tools and thus were uniquely placed to benefit from them and act as stewards to artists who wished to enter these spaces. Their access and position as engineers granted them different authorial standards in contrast to many artists, such as Sheridan, who were working in similar spaces.

Further, Knowlton and Harmon's professional mobility was not restricted to the labs. Due to their contextual linkage to groups such as Experiments in Art and Technology (EAT)—co-founded by fellow Bell Labs engineers Billy Kluver and Fred Walehauer alongside artists Robert Rauschenberg and Robert Whitman—they were able to move easily into the art sphere as well. This connection facilitated the incorporation of *Nude* in many of the pivotal exhibitions of art and technology, such as Jasia Reichardt's *Cybernetic Serendipity* at the Institute of Contemporary Arts, London, England (1968); The MoMA's *The Machine as Seen at the End of the Mechanical Age* (1968); *Some More Beginnings* (1968) at the Brooklyn Museum, New York; and a showing at the Howard Wise Gallery, New York, an especially important venue for media art history. In addition to exhibitions, *Nude* is cited as an example of cybernetic art in Gene Youngblood's canonical text *Expanded Cinema*, further demonstrating the level of expertise and mobility granted to Harmon and Knowlton's work across industry and art circles.[5] Additionally, Youngblood and Reichardt's works also demonstrate how *Nude* was taken into consideration as part of the 1960s cybernetic fascination highlighted by authors such as Pamela Lee, adding yet another vein of historical visibility for their work.[6]

However, *Nude's* exposure and acceptance is deeply interwoven with gendered norms and expectations across both spaces, which helped grant authority to the engineers. This is underscored by the comparatively sparse documentation of Sheridan's work in scholarship. Sheridan has received fairly brief recognition in the growing research on art and technology partnerships, despite her involvement in exhibitions such as Jack Burnham's *Software* exhibition at the Jewish Museum, New York, in 1970. Sheridan also wrote prolifically about her practice in journals such as *Leonardo*, while spearheading her own educational program at the School of the Art Institute of Chicago (SAIC). Documents in Sheridan's extensive archive at the Fondation Daniel Langlois show that, during the early 1970s, Sheridan was consulted extensively by other artists, institutions, and schools looking for expertise and guidance on scanning technologies.[7] Yet despite the amount of materials remaining from Sheridan's work, her placement in the art historical literature is minimal in comparison to the status accorded to Harmon and Knowlton. That a woman would receive less historical attention than two white men is not in the slightest an irregular or remarkable occurrence. It does, however, in the context of the rising interest in interdisciplinary art and technology histories, highlight how systemic gendered barriers need to be examined as they operate, shift, and cut across multiple disciplines.

5. Gene Youngblood, *Expanded Cinema* (New York: E.P. Dutton, 1970), 201.

6. Pamela Lee, *Chronophobia: On Time in the Art of the 1960s* (Cambridge, MA: MIT Press, 2004).

7. Sonia Sheridan Fonds, *General Systems*, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

This is especially important in consideration of the technology industry during the time period that Sherian, Knowlton, and Harmon were working. As scholars such as Nathan Ensmenger have shown, the imaginary of the male computer/engineer genius was a powerful force in shaping ideas of expertise and labour within and outside technology workspaces during the 1960s and 1970s.[8] The history of coding is one especially notable example of this interrelation, as it was initially a female-dominated field when it was considered manual labour, even though they were often still referred to as "Computer Boys."[9] This gendered division of labour is embedded in the then categorization of "soft"ware as feminine, in contrast to the more masculine expertise of "hard"ware—both terms which, Ensmenger notes, embody the gendered assumptions of the context from which they emerged.[10] The transition to a predominantly male-oriented space occurred only when coding began to acquire a certain level of prestige or high-level scientific status, mainly through professionalization schemes designed to best serve male workers. As Ensmenger demonstrates, part of this professionalization relied upon creating a masculine imaginary of a computer programmer in order to distance the field from its manual, and feminine, status, and popularize the image of the male computer genius.[11] Additionally, as Lisa Nakamura has shown, this masculine professionalization further obfuscated the vital work of many women of colour, whose labour formed the core of the electronics industry.[12]

While this history may seem out of the scope of art history, for cross-disciplinary scholarship, it is an essential consideration as it impacts the materials, critiques, visibility and technologies involved in writing these histories. As this essay will show, the workplace engineering culture and mythology around Bell Labs actively contributed in many ways to the kind of male computer genius imaginary described above. The Labs have been mythologized thoroughly in grandiose terms such as the following:

> What bound them was a shared belief in the nearly sacred mission of Bell Laboratories and the importance of technological innovation. The men preferred to think they worked not in a laboratory but in what Kelly once called "an institute of creative technology" … They were paid for their imaginative abilities. But they were also paid for working within a culture, and within an institution, where the very point of new ideas was to make them into new things.[13]

The tale of Knowlton and Harmon's *Nude* is intricately interwoven in the mythos of such statements above, as well as the genuine work freedom given to the engineers. Importantly, this kind of allowance granted Knowlton and Harmon the security and space to take risks with little fear of consequences for their career.

Though rarely mentioned in the scholarship around *Nude*, this context, which was undeniably gendered, helped propel and legitimize Knowlton and Harmon outside, and inside, of the Labs. While for Sheridan, her career was a continual balancing act between multiple stake-holders across disciplines, who were often in disagreement, and frequently left her in precarious positions. Despite their differences, these collaborative nude portrait

8. Nathan L. Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge, MA: MIT Press, 2010).

9. Ensmenger, ibid.

10. Ensmenger, "Introduction," ibid., 12, and "The Professionalization of Programming," ibid., 163–194.

11. Ensmenger, "The Professionalization of Programming," 163–194.

12. Lisa Nakamura, "Indigenous Circuits: Navajo Women and the Racialization of Early Electronic Manufacture," *American Quarterly* 66, no. 4 (December, 2014): 919–941.

13. John Gertner, *The Idea Factory: Bell Labs and the Great Age of American Innovation* (New York: Penguin Press, 2012), 3.

projects are linked through their shared and co-evolving development of computerized scanning imagery, with an overlapping narrative of the need to "humanize" new technologies in which the nude portraits become at times conduits and at other times points of contention. The critical reception of the nudes, and their categorization as humanizing or not, is deeply interrelated with the issues of access, expertise, and gender I have begun to outline above. These works highlight the stakes of interdisciplinary scholarship, as they represent on-going sites of negotiations of power across disciplines, where dominant narratives of gender and industry are re-articulated, coded, and embedded into the technologies, reception, and materials of the nudes.

From Joke to Porn to Art

Nude first came into existence as a three-and-a-half-meter-long practical joke on Bell Lab's Executive Ed David. Knowlton and Harmon covered one wall of David's office with a mural "made of small electronic symbols for transistors, resistors, and such."[14] As more distance is achieved between the eye and the mural, the spotted outline of a form begins to take shape. Eventually, when viewed from far enough away, the individual symbols are no longer legible, and they coalesce into a nude figure. The moment of surprise reveal was evidently meant to be the prank. However, their joke was met with a resounding thud from the Lab's administration. David returned from vacation to find *Nude*, and realized that due to the location of his office *Nude* was seen by most people in the workspace primarily from a distance—meaning they were also only seeing a giant nude and not the symbols and patterns. As a result, *Nude* lasted only one day as an office mural, and was relegated to the recreational room in the basement, having been labeled as "unseemly" and pornographic. Knowlton and Harmon were told by the Labs administration that they were not to circulate the image any further and, if they did, it better not have any link to Bell Labs.[15]

From its very inception, *Nude* was encoded with gender, initially realized as a practical joke contingent on the reading of *Nude* as a naked female form, followed by the resultant banishment—also based around "her" nudity. *Nude*'s usage as an experimental model for image processing bears striking similarities to the story of the Lena test image, pointing to the importance of a shared socio-cultural environment wherein the usage of light-skinned, often naked, females as test standards for technologies is a norm. The Lena image was torn out of the centerfold of a 1972 *Playboy* magazine and then used as one of the first digital test images for the engineers at the University of Southern California. Like *Nude*, Lena's body was also censored, cropped just at the shoulders to avoid showing her exposed breasts, though the image retains some reference to the identity of the model, Lena Söderberg.

As Dylan Mulvin has examined, Lena would become the most commonly used and popular test image in the industry, marking the gendered dynamics of engineering labs and education, as well as how these practices then become embedded in the development of technologies.[16] Mulvin notes

14. Kenneth Knowlton, "Portrait of the Artist as a Young Scientist," *Ken Knowlton*, http://www.ken-knowlton.com/pages/04portrait.htm. Accessed September 14, 2019.

15. Ibid.

16. Dylan Mulvin, *Reference Materials: The People, Places, and Things of Making Measurements*, PhD Thesis, McGill University, Montreal, Canada, 2016, http://digitool.library.mcgill.ca/R/?func=d-bin-jump-full&object_id=143750. Accessed September 14, 2018.

that while the stories from the engineers do not align in regards to why Lena was chosen as the test image, they nonetheless highlight a sphere of male homosociality, where the access and usage of *Playboy* magazines was neither questioned nor seen as outside of the norm for workplace material. As with *Nude*, Lena also highlights the freedom of experimentation that the engineers enjoyed at work, and the action of choosing to employ this security to frame, scan, and utilize the female form as a site of technological experimentation. Although Knowlton and Harmon's prank may have been met with some disapproval, this sentiment in no way hindered their career. It is telling that *Nude* was not even removed from the labs, but instead delegated as part of the pleasure and leisure zone of the labs—highlighting again the gendering of space.

Nor did *Nude's* delegation as unseemly hinder its circulation. While *Nude* was not intended as a test image in the same manner as the Lena image, the popularity and mobility *Nude* achieved when it left the lab did mark *Nude* as a shining example of the expertise of engineers, framed within a particularly masculine social-context. Indeed, when *Nude* escaped the auspices of the recreation room and made a very public appearance in the *New York Times* and the New York art scene, it would be viewed as a feat of engineering and as exemplar of the new calculating powers of the computer. The dialogue of technical mastery was bolstered by the particular socio-cultural milieu *Nude* suddenly entered. *Nude* was picked up as promotional material for the newly formed E.A.T., becoming promotional material for the potential dialogues between engineers, scientists and artists. *Nude* would make its first appearance as a large mural at a press conference for E.A.T. at Rauschenberg's New York home.[17] It is significant that *Nude* was not the only representation of the female form at the event. In addition to *Nude*, the newspaper notes that visitors were "intrigued by a sculptural representation of a woman taking a shower," while "miniskirted girls in paper smocks" were amongst the representatives promoting "people-oriented" technology.[18]

Notably, in this drive for cross-disciplinary collaboration, the prevalent subject for these potential new emerging technologies was the female form. This was contrasted with the predominantly male E.A.T. organizing team and the predominance of male engineer participants. In this context, the popularity of *Nude*, and its creation by Knowlton and Harmon, continues to solidify the kind of masculine computer expert that Engsmenger demonstrates was promoted and imagined. Placing emphasis on the brilliance of the engineers and their mastery over the powers of the computer, *Nude* became a kind of calling-card for both E.A.T. and Bell Labs. This was further underscored when, shortly after the promotional evening, *Nude* appeared in the *New York Times*, where—as Patterson notes—*Nude* is peculiarly characterized not as "generated by a computer" but "masterminded by two engineers."[19]

Significantly, this framing paralleled the computer industry movement to masculinize coding and programming, making the visibility of Knowlton and Harmon as "masterminds" particularly poignant in the face of the attempts to minimize female involvement in computing. As Ensmenger

17. Knowlton, "Portrait of the Artist."

18. Henry R. Lieberman, "Art and Science Proclaim Alliance in Avant-Garde Loft," *New York Times*, October 11, 1967, 49.

19. Patterson, 46.

notes, the usage of the imaginary of an artistic genius fit well with that of a mastermind male programmer, granting them authority and expertise across both industry and cultural imaginary.[20] This is underscored by the fact that, once again, neither Knowlton nor Harmon received any backlash from *Nude's* very public escape from the recreational room. In fact, shortly after *Nude*'s high-profile exposure to New York, Bell Labs decided it needed to reclaim the image. Recognizing *Nude's* popularity, Bell Labs changed its perspective on *Nude* as pornographic material and ordered Knowlton and Harmon to make sure that everyone knew that *Nude* had been made using Bell Labs facilities.[21] Its consequent reclaiming after Bell Labs' realization that *Nude* could result in lucrative visibility for them marks female nudity once more as either illicit or profitable.

Mastering Technology and Hiding the Hand

The theme of technological mastery using the female form as a conduit would be strengthened by the exhibition narrative *Nude* would be woven into. Bolstered by its connections to E.A.T., *Nude's* mobility into the art sphere was swift, and, as Patterson argues, coincided with nascent interest in art and technology.[22] Further aided by 1960s "technophilia" and the popular fascination with cybernetics, described by scholars such as Anne Collins Goodyear and Pamela M. Lee, *Nude* was rapidly circulated through several exhibitions in 1968, including *The Machine as Seen at the End of the Mechanical Age*.[23]

As the title suggests, the exhibition announced the end of one era of technology, and projected many of the anxieties around the future of technology that Patterson describes. The MoMA's press release tellingly explains this transition as follows:

> the mechanical machine—which can most easily be defined as an imitation of our muscles—is losing its dominating position among the tools of mankind. Its reign is being threatened by the growing importance of electronic and chemical devices—which imitate the processes of the brain and nervous system.[24]

Important in this description is its rhetoric of computers as an intelligent, "independent," and "uncontrollable" sensory mechanism, and consequentially potentially dangerous. The exhibition catalogue also constructed a narrative that highlighted the brilliance of inventors and artists who had harnessed these technologies, demonstrating that these efforts could enforce the "criteria of respect and appreciation for human capacities, freedom, and responsibility that prevail in art."[25]

These over-arching goals were reflected in the manner in which *Nude* was presented and interpreted by the exhibition and, importantly, mark a change in title to *Studies in Perception I*. This shift in title serves to frame *Nude* as more of a technological mechanism, granting it a kind of seriousness not at all present in its initial inception. The authority imbued in the work is underscored in the catalogue where *Nude* is described as a "computer-processed photographic print" which is indicative of the "characteristics of the

20. Ensmenger, "The Black Art of Programming," Ibid., 47–50.
21. Knowlton, "Portrait of the Artist."
22. Patterson, 57–59.
23. Anne Collins Goodyear, "From Technophilia to Technophobia: The Impact of the Vietnam War on the Reception of 'Art and Technology,'" *Leonardo* 41, no. 2 (2008): 169–173. See also Lee, *Chronophobia*.
24. The Museum of Modern Art, *The Museum of Modern Art, No. 123*. Press Release, November 27, 1968. https://www.moma.org/momaorg/shared/pdfs/docs/press_archives/4149/releases/MOMA_1968_July-December_0081.pdf. Accessed September 16, 2018.
25. Pontus Hultén, ed., *The Machine: As Seen at the End of the Mechanical Age*, exh. cat. (New York: Museum of Modern Art, 1968), 13.

computer…The computer can act as an intelligent being: process information, obey intricate rules, manipulate symbols, and even learn by experience."[26] Combined with its new title, *Studies in Perception I*, and the exhibition's overarching portrayal of computers as mimicking human nervous systems, *Nude* is presented not as a simply representational image, but as a perceptual mechanism that captures and codifies vision. Through its framing, *Nude* stands in for the potential of the computer, and the engineers' capacities as its programmers.

However, the work and its position in the exhibition do not equally insist on making visible all material mechanisms involved in *Nude*, and the material processes it hides parallel the gendered labour codes in the industry. Presented as a computer-processed image, *Nude* is still encountered as a form of computer-simulated vision, presented to viewers as a play on human perception. This situates the computerized image as a seemingly instantaneous result of processing and visualizing data. However, to the contrary, the amount of human involvement in the creation of *Nude* quickly strips away the claim that *Nude* is a purely computer-processed image.

The actual process of making *Nude* involved several different machines, transcriptions, and a fair bit of manual labour.[27] Knowlton and Harmon began with a picture of dancer Deborah Hay, which was then fed into a flying-spot scanner. As the scanner was generally used to convert film into broadcasting material, its output was analog. The analog data had to then be converted into programming text for the computer. From this, the computer would develop the image into gridded rows, choosing from two possible patterns. Each row was then projected onto six separate 35mm microfilm strips. The microfilm strips were enlarged, and then sown together to form a complete image, which was then photographed and enlarged once more. The final 25 × 20 centimeter photograph could then be used to make larger prints, such as the 3.5 meter mural. The finished product's seamless surface and its title as a "computer processed" image occlude the observer from being able to grasp the amount of coordinated background work and apparatuses necessary to produce *Nude*.

The obfuscation of the amount of manual labour—such as sewing—required to make the final piece parallels the similar attempt to eradicate the manual—and feminine—roots of the computer industry, branding it as high-minded, masculine, technological work. The catalog echoes the *New York Times* portrayal of *Nude* as technical intelligence "masterminded" by engineers: "But since [the computer] is not capable of initiating concepts, it cannot be truly creative; it has no access to imagination, intuition, and emotion."[28] It is clear from the description and from the exhibition's narrative that the creative, emotional, and imaginative qualities are where humans are understood to prevail over the computer. In reference to *Nude*, the creative force refers to the engineers, presenting them as the humanizers of the cold, calculating computer, aligning them with the imaginary of the brilliant, artistic coder. Within this context, the codifying of the human body becomes especially potent as it is used to demonstrate this techno-genius narrative.

26. Ibid., 207.
27. See Patterson, 49–54, for a thorough description of the material processes.
28. Hultén, *The Machine*, 207.

This is further complicated when returning to the *Nude's* gendered inception. Knowlton astutely recounts that:

> We did make similar pictures—of a gargoyle, of seagulls, of people sitting at computers—which have appeared here and there. But it was our Nude who would dolphin again and again into public view in dozens of books and magazines. Sometimes it is excused by a more dignified title, like *Studies in Perception I*.[29]

Knowlton acknowledges the role the female form played in making *Nude* such a success, pointing out that from the number of images Knowlton and Harmon produced, *Nude* was consistently the most popular. Importantly, as Patterson points out, Deborah Hay was a contemporary dancer whose work was very concerned with perception, form, and bodies, which could be used to complicate the interpretation of the image as a nude portrait.[30] Indeed, Hay had participated in E.A.T., and this connection was how Harmon and Knowlton ended up with her image. The story goes that the engineers called Kluver asking if he knew any artists who would pose nude for them. Kluver asked Hay if she would be willing to pose naked for ten dollars, and she agreed.[31] However, Hay is not credited in *The Machine* exhibition, and it is not clear if Hay ever consented to have *Nude* shown in any public venues, or if she was compensated further.

While it is true that Knowlton and Harmon never originally intended for *Nude* to circulate beyond the labs, that it was a figure of a nude female body has implications for how we understand the work within the context of *The Machine* and its overarching narrative about technology. Within the narrative of a mastermind harnessing the technical apparatus in order to humanize it, the image used to demonstrate that control and humanization is that of a naked woman. This is further underscored by the narrative of the show which sought to highlight the true "human capacities" in art by demonstrating "complete domination over machines."[32] The female nude not only fits perfectly as a reference point for the art dimension of this tale, but also the rhetoric of humanizing technology.

As Mary Hunter has shown, the usage of the naked female form in science and technology as a means of marking progress and claiming male expertise has a long history.[33] Hunter astutely notes how art and material culture became a field to circulate these claims through paintings of doctors and scientists, as well as other ephemera such as the wax forms of the models. Additionally, in circulating these materials, the rhetoric of scientific expertise and progress frequently served as a way to conceal the pleasure and enjoyment associated with the making and viewing of these objects.[34] As scholars such as Janell Hobson have analyzed, the usage of the white female form as a medium for technological and scientific achievement is important, as it gestures towards how this gendered history is equally one that is embedded in race.[35] Using the treatment of Saartjie Baartman as an example, Hobson notes that while white female forms were used in science and medicine to mark progress and beauty, black female bodies were violently used in quite the opposite way as representations of the grotesque and the unknown.[36] As Lorna Roth and others have noted, this has had

29. Knowlton, "Portrait of the Artist."

30. Patterson, 50.

31. Art & Science Collaborations Inc., *Bell Labs & The Origins of the Multimedia Artist*, November 8, 1998, The Great Hall at The Cooper Union (transcript of a panel discussion), https://ethw.org/Archives:Bell_Labs_&_The_Origins_of_the_Multimedia_Artist. Accessed September 16, 2018.

32. Hultén, *The Machine*, 13, 11.

33. Mary Hunter, *The Face of Medicine: Visualising Medical Masculinities in Late Nineteenth-Century Paris* (Manchester: Manchester University Press, 2015). See also Mary Hunter, "'Effroyable réalisme': Wax, Femininity, and the Madness of Realist Fantasies," *RACAR* 33, no. 1/2 (2008): 43–58.

34. Ibid. By "pleasure of making the nudes," I refer to the doctors and artists and not the models, as Hunter makes clear that many of the wax casts, for example, would have been quite painful for the models due to open wounds.

35. Janell Hobson, *Venus in the Dark: Blackness and Beauty in Popular Culture* (New York, NY: Routledge, 2005). See also Janell Hobson, "The 'Batty' Politic: Toward an Aesthetic of the Black Female Body," *Hypatia* 18, no. 4 (Autumn/Winter 2003): 87–105.

36. Ibid.

longstanding implications, as the white body has continually been centered as the recipient and audience for the development of medicine and technologies.[37]

Nude, with its championing of the white female form as a medium for male technological progress and engineering expertise, is a continuation of these complex gendered and raced histories. The shift in its title, from *Nude* to *Studies in Perception I*, similarly functions as a way to veil the pleasure and spectacle associated with the image through utilizing language that gestures towards scientific and technological experimentation. Further, with its appeals to mastermind male engineers, *Nude* was not only well suited to circulate in the art field to assuage concerns over technological progress, but the engineering field as well. *Nude's* mobility between disciplines served to heighten Knowlton and Harmon's expertise, granting them further visibility and helping establish further contacts such as Schwartz, whom they met through *The Machine* exhibition.

Negotiating Expertise: Between Industry, Academia, and Art

In contrast to *Nude* and the relative security the engineers enjoyed, Sonia Sheridan's work with 3M was a continual struggle for expertise, access, and support. Unlike *Nude*'s prank beginnings, Sheridan's collaboration with 3M began in 1970 with the understanding that it could be a market-boosting enterprise, with Sheridan as the conduit and unofficial company representative for the creative potentials in colour scanning technologies. Balancing the interests and stakes of industry, teaching, and artistic practice proved to be immensely difficult for Sheridan, as each often argued for competing objectives. Sheridan's artwork series *Man-Scan* was produced in an attempt to placate all three interests. However, far from appeasement, *Man-Scan* sparked controversy and endangered Sheridan's relationship with all of her professional milieus, poignantly highlighting her gendered labour conditions. While the negative reaction had much to do with gender and the exposure of a male body, it was just as much intertwined with socially constructed narratives around expertise and scanning technology as a medium.

Although *Man-Scan* would make the tense socially-embedded context of emerging technology sharply visible, Sheridan's research with 3M already began from a complex negotiation of values, visions, and anxieties. Many of these sentiments would inform the public reception of *Man-Scan*. Sheridan's impetus to collaborate with industry echoes *The Machine* exhibition's narrative:

> We have seen all too clearly how the dreams of scientists have been applied to produce a dehumanized environment. It is time that the artist redirected this application to genuine human needs. We will be living in a technological society. There is no turning back.[38]

Like *The Machine*, Sheridan positions technology as a potentially dangerous force. As with E.A.T., Sheridan believed the answer to the fear of technology was to unite art and science to produce "genuine new insights."[39] These sentiments prompted her engagement with 3M.

37. Lorna Roth, "About the Colour Balance Project," *the colour balance project (BETA)*, http://colour-balance.lornaroth.com. Accessed March 1, 2020. See also Simone Brown, *Dark Matters: On the Surveillance of Blackness* (Durham, NC: Duke University Press, 2015) and Shoshona Magnet, *When Biometrics Fail: Gender, Race, and the Technology of Identity* (Durham, NC: Duke University Press, 2011.)

38. Sonia Landy Sheridan, *Essai, Sonia Landy Sheridan, Statement In-Time* (manuscript), 1975, 25–28. Sonia Sheridan Fonds, ANT INT 00029218, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

39. Ibid.

Unlike Knowlton and Harmon, Sheridan's contact with 3M was always on the condition that she could achieve a productive result from her findings, from technological innovations to potential marketing opportunities. Although the exact context that led Sheridan, the colour scientist Douglas Dybvig and business manager Don Conlin to meet is unclear, the collaboration is said to have started with a phone call shortly after they met.[40] Dybvig had been working as the Technical Director of Industrial Graphics at the St Paul, Minnesota 3M complex. In 1965, Dybvig conceptualized a way to produce the first instant colour scans. The black-and-white scanning market was at the time dominated by Xerox, and a colour scanning product promised a potential new avenue for 3M to edge its way back into the market. However, Dybvig and business manager Don Conlin disagreed on the machine's possible use, between either office or graphic design applications. Sheridan is said to have solved this debate with a phone call in 1969 to Conlin in which she argued for the machine's use for graphic design and textiles, and her own usefulness in the production of these methods.[41]

Sheridan began her first "artist-in-residence" project in the summer of 1970. Indeed, Sheridan did prove to be useful in helping the company find new insights into their products. Dybvig noted that Sheridan gave them "confidence that [the] machine could stand on its own in terms of graphic design" and helped them realize the different possibilities that the 3M machine could produce other than simply "yellow, magenta, cyan, red, blue, and green."[42] Sheridan's experiments with printing opened up different commercial avenues into clothing printing, textiles, graphic design, and advertising. Highlighting the different standards set for Knowlton and Harmon in the workplace, Dybvig and Conlin describe Sheridan—as if expecting something different—as a "humanly and politically astute" individual who "dressed in a non-offensive way and worked eighteen hours per day for six weeks."[43]

Further contrasting the free experimentation afforded to engineers in Bell Labs, Sheridan's department was merely one of 400 companies within the umbrella of 3M and was viewed as an experimental project.[44] In order to survive, Color in Color had to prove itself to have a market and thoroughly integrate into this market. 3M's need for mass market integration posed a problem for Sheridan, who at this point had begun to build a career on becoming an artist and professor known as the mediator for scanning technologies in the art circuit. Her exclusive access to the equipment proved to be quite lucrative as it allowed her to produce artworks and teach on subjects that many others, who lacked her access, could not. In response to a letter from 3M regarding the company's plan to package detailed instructions when selling their Color in Color scanners, Sheridan wrote:

> my status as a professional artist requires that I concern myself with letting the world know that I am involved in that pioneering work. This is essential for me . . . if 3M now begins to distribute information about the use of Color in Color for art purposes, anything I have to say will quickly become old hat.[45]

Written at the beginning of their partnership, this letter from Sheridan to 3M is essential to understanding the working dynamics of their

40. Peter Hunt Thompson, "In-time," Sonia Landy Sheridan, Peter Hunt Thompson, and Friends of Photography, eds., *In Time: being a brief inquiry into the nature of electronic imaging machines* (Carmel, CA: Friends of Photography, 1975).

41. Ibid.

42. Douglas Dybvig, "Art and Science: A Quote by Douglas Dybvig," in *Energized Art and Science: Sonia Landy Sheridan*, ed. Sonia Sheridan (Saint Paul, MI: The Chicago Museum of Science & Industry and the 3M Corporation, 1978), 60–62.

43. Thompson, *In Time*, 2.

44. Ibid., 3.

45. Sonia Landy Sheridan, *Correspondance entre Sonia Sheridan et* 3M, *Non-daté* (manuscript), 1971. Sonia Sheridan Fonds, SHE 00034457, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

collaboration, and the constant negotiations for authority and access Sheridan had to navigate.

In order to satisfy both her artistic expertise and her relationship with 3M, Sheridan proposed that she become a key part of their promotional strategy. A 1973 letter from Conlin to Sheridan gives some scope of her internal company use:

> you will meet with the consumer products division and the commercial division. Following that, we would like you to present an informal seminar to these same people giving your thoughts about possible new approaches to the art and craft markets as well as the game and puzzle markets.[46]

Sheridan's reach as a promotional figure influenced almost all aspects of her career, especially her publications, and it is evident that this work played a substantial role in maintaining her access to 3M's facilities and contacts. Sheridan worked to build the image of 3M and technology as "creative tools for the artist."[47] She wrote, for example, in her 1972 *AfterImage* review, that the Color in Color machine was the "next revolution in image-making."[48] The article unmistakably functioned as an advertisement for 3M directed at the artistic and educational community, and contained separate sections on different mediums of art and their opportunity to benefit from the machine.

In contrast to the involvement of Bell Labs after *Nude* gained traction, 3M was consistently involved in Sheridan's exhibitions, leveraging her position as an artist from the outset for promotional opportunity. 3M would often produce and pay for the promotional materials and catalogs for Sheridan's exhibitions and workshops, always with a small blurb in each catalog endorsing their machines. Included in these publishing efforts was their donation of a scanner and additional printed materials to the *Software* show, for which they also sponsored Sheridan's participation.[49] 3M even began organizing mini-exhibitions for Sheridan's work across the various centres they owned. Frequent letters from their senior division publicist discuss strategically flying her out to these exhibitions and workshops to give talks to the press and cultural institutions.[50] Undoubtedly, this provided Sheridan with many opportunities and some expertise in relation to scanning machines, as she began to receive numerous letters and requests asking for scanning advice, as well as a few letters from different printing companies asking her to try out their technology.[51]

Man-Scan: An "Artistic Flop"

While the extensive marketing work through 3M provided Sheridan some authority in relation to technology, her method of utilizing the machines and the complete re-orientation of her teaching and artistic practice around them began to cause problems for her perceived legitimacy as an artist. Throughout the promotional material produced for 3M and her own practice, Sheridan articulated that scanning machines allowed new and deeper insights into perception through this versioning, enabling a greater picture through collating a mass of documents. She was particularly fascinated with the instantaneous image reproduction scanners allowed, and their capacity

46. Don Conlin, *Correspondance entre Sonia Sheridan et* 3M, *Non-daté* (manuscript), 1973. Sonia Sheridan Fonds, SHE 00034457, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

47. Sonia Sheridan, "Generative Systems," *Afterimage*, April (1972): 2–3.

48. Ibid.

49. [Plan de travail pour l'exposition «Software»] / Sonia Landy Sheridan. ca 1970. (1 feuillet). Sonia Landy Sheridan Fonds, 0501-120-5, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

50. Lee Horn, *Letter to Sonia Sheridan*, ca. 1973. Sonia Sheridan Fonds, SHE 00034457, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

51. Sonia Sheridan Fonds, General Systems, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

to translate effects like sound, heat, and movement into a document. Combined with the ability to produce large quantities of copies in small periods of time that could capture these minute sensory changes, she argued that scanners enabled a more in-depth study of patterns and symbols, helping to "break through the barriers of understanding."[52] Not only did documents serve as archives, they also served as sites for predicting, creating, and analyzing information, forming what she called "in-time" processing. Unsurprisingly, as a consequence of this framework, Sheridan's practice became oriented around research, workshops, experiments, and process-based works rather than individual artworks. The educational program she founded at the SAIC in 1970, "Generative Systems," was conceived as a "research center," and was largely structured around 3M scanning technologies.[53]

However, this close involvement with industry and reluctance to produce art objects in favour of processes often led to tensions with the SAIC, who were concerned that Sheridan was not producing enough exhibition material.[54] Sheridan noted that this was not helped by the fact that, as a female professor, her pay was quite low in comparison to her male colleagues and her husband—who taught at Northwestern University.[55] Sheridan further observed how unlikely it would have been that she could have done her collaborative projects had she not been married, as the university expected her to receive funds from her husband.[56] Looking to appease SAIC and acquire more financial security, Sheridan applied to both the National Endowment for the Arts (NEA) and the Guggenheim Fellowship program in 1973. She was awarded both. The Guggenheim Fellowship was for $12,000 to use between 1973–74, and the NEA award was for a short MoMA exhibition from June 4 to July 14 in 1974. The MoMA exhibition provided the perfect forum for Sheridan to produce work using the Color in Color prototype and to promote it through the exhibition. Indeed, alongside the portraits of Puls was a small didactic which provided detailed instructions as to how the nudes were produced, and of course, their use of 3M's materials.

Man-Scan was never directly stated to be in dialogue with *Nude*. There are, however, some distinct similarities in themes that overlap the two works. Like *Nude*, viewing *Man-Scan* was a practice in visually decoding a human form through technological reproduction, as the image shifts from parts to a whole depending on proximity. *Nude* and *Man-Scan* articulated a way to code and process the human body into digestible information. Each frame captured not just varying parts of Puls's body but also the subtle shifts and differences in each unique moment of scanning; thus, highlighting the lived contingency of material interactions and their translatability into documents. | **fig. 2** | As a result, the portraits are an informatic and gridded framing of Puls's body, captured across several moments in time, and made visible to the viewer. This highlights an ability to transform and read living bodies as material and information, just as *Nude* claimed bodies could be processed. Although *Man-Scan's* intense manual work is much more evident to the eye, *Nude* also involved a large amount of manual work and technical coordination—including elements of scanning, photography, and sewing.

52. Sonia Sheridan, *Breaking Barriers with Copy Machines* (manuscript), 1973. Sonia Sheridan Fonds, 00029369, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

53. Sheridan, "Generative Systems," 2.

54. Kathryn Farley and Sonia Landy Sheridan, *Interview with Sonia Sheridan, Chapter 63* (oral history), 2006. Sonia Sheridan Fonds, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie. http://www.fondation-langlois.org/html/e/page.php?NumPage=2051. Accessed September 16, 2018.

55. Ibid.

56. Ibid.

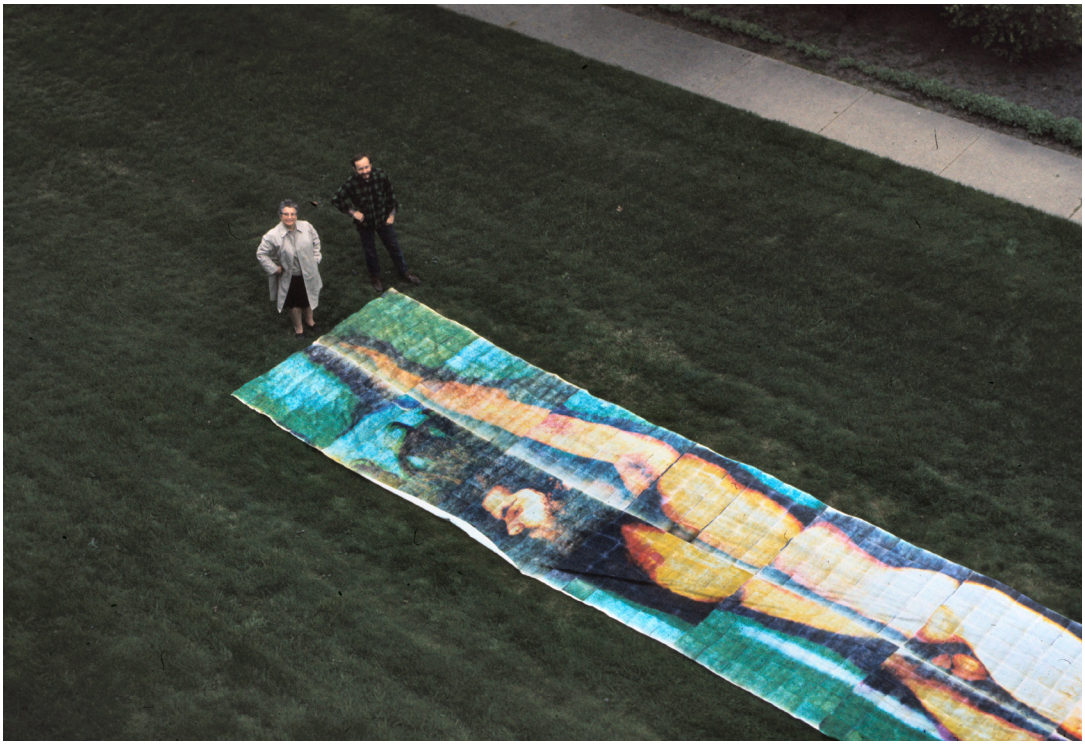

Figure 2. Sonia Sheridan, *"Man Scan" with Ric Puls*, 1974. Process: Color-in-Color; Photo: Dennis Longwell; 1 slide, col.; 35 mm. The Daniel Langlois Foundation for Art, Science, and Technology, Sonia Landy Sheridan fonds. Courtesy Daniel Langlois Foundation and Cinémathèque Québécoise, Montreal.

Likewise, *Man-Scan* also speaks to the longer gendered history of male expertise and the female nude. When Sheridan's *Man-Scan* appeared at MoMA, the art field in the United States was fully in the midst of movements such as conceptual art, and the conventional female nude had largely been rendered old-fashioned by feminist interventions which made the subject into a highly charged, often oppositional theme. However, Sheridan's usage of the male nude is significant, particularly when placed in dialogue with Linda Nochlin's then-recent feminist intervention "Why Have There been No Great Women Artists?"[57] Nochlin's canonical text highlighted the many institutional barriers faced by women artists, particularly in relation to their difficulty in accessing life drawing classes.[58] In relation to the nudes by Sheridan and Knowlton and Harmon, there is an undeniable parallel here between the ability of engineers—predominantly men—to access technological equipment, and Sheridan's constant struggle to maintain access to similar spaces. In this light, that both the engineers and Sheridan chose the nude as their subject matter is significant, as *Nude* continues the same pattern of institutional access, while Sheridan's *Man-Scan*—in her both her selection of the nude and the male form—in many ways resists and confronts these historical barriers.

However, Nochlin's work also shares something else with Sheridan's *Man-Scan*. At the 1972 College Art Association in San Francisco, Nochlin's photographic intervention "Buy my Bananas," which featured a male nude, received a strong reception from the crowd in the room.[59] This response, which for Nochlin emphasized her argument about the different treatment of the female nude in contrast to the male nude, parallels the potent critical reaction to *Man-Scan*.[60] Despite their similarities, *Man-Scan's* reception was dramatically different than that of *Nude*. In another article in the *New York Times*, "The Sheridan-Smith Show: A Misalliance of Art and Technology," the exhibition is described as an "artistic flop," with the author, Peter Schjeldahl, seeming especially taken aback by their choice of portraiture.[61] Tiptoeing around the exposed penis as the offense—or flop—Schjeldahl complained that Puls was a rather unattractive and hairy subject matter to reproduce. Important to note is that the title directly mimics that of the *New York Times* article that discussed E.A.T. and *Nude*, a purposeful frame of reference by Schjeldahl, who used *Man-Scan* as an example for why art and technology collaborations were a waste of time.[62] Schjeldahl had previously expressed his distaste for E.A.T. in other articles, such as one feature on Rauschenberg's career where Schjeldahl's assessment was positive overall–except for a mention of the "mostly disappointing scheme (EAT)."[63] This begins to highlight some of the different standards that Sheridan's piece was held to in contrast to Knowlton and Harmon.

Schjeldahl argued that the exhibition failed to represent the "humanity" of technology or art, stating "the human image is trivialized by the technical aspects of the process: the enlarged sizes, garish colours and various materials that, though fetching, merely demonstrate what the machine can do."[64] Other letters written privately to the MoMA also expressed similar concerns,

57. Nochlin, Linda. "Why Have There Been No Great Women Artists?" *Art News*, January 1971, 22–33, http://www.artnews.com/2015/05/30/why-have-there-been-no-great-women-artists/. Accessed March 1, 2020.

58. Ibid.

59. Nochlin's text was reproduced in *Woman as Sex Object*, ed. Thomas B. Hess and Linda Nochlin (London: Allen Lane, 1973). Additionally, Nochlin wrote about her recollections of the conference presentation in a press release for Kate Werble Gallery, *Buy My Bananas, Statement Linda Nochlin*, 2012, www.katewerblegallery.com/files/kwg-buy-my-bananas-pr-2012.pdf. Accessed March 20, 2020.

60. Nochlin, 2012.

61. Peter Schjeldahl. "The Sheridan-Smith Show: A Misalliance of Art and Technology: A current Museum of Modern Art show is 'an artistic flop,' but 'evidence that art exploiting technical gimmickry gets museum attention,'" *New York Times*, June 23, 1974, 127, https://search.proquest.com/hnpnewyorktimes/docview/120037462/abstract/D8631D65111446EDPQ/2. Accessed September 14, 2018.

62. Ibid.

63. Peter Schjeldahl, "Rauschenberg Just Won't Be Boxed In," *New York Times*, October 31, 1971, D21, https://search-proquest-com.proxy3.library.mcgill.ca/docview/119104977/48C33C8B-C24A460EPQ/14?accountid=12339. Accessed March 1, 2020.

64. Ibid.

stating that the figure had been "alienated," and that it belonged in a craft museum.[65] Considering Schjeldahl's clear disdain for the male nudity on display, one cannot help but wonder whether, if Sheridan had chosen a female image for the work, this capturing of the human form would have seemed less "trivial" or offensive. This is particularly curious as Hay's portrait—also exhibited at the MoMA—was very popular exhibition material, and neither questioned nor seen as a mockery of the female form. It speaks to the more easily accepted rendering of the female body as digestible information and technological experimentation, as well as the gendering of technology.

Though, for Schjeldahl, *Man-Scan's* failure is also a question of mastery or, in his mind, lack of mastery. Combined with the offensive capturing of the male form, the amount of technical manipulation and effort that was used to produce *Man-Scan* was not recognized as Sheridan's work—instead it was merely the machine's performance. Schjeldahl further commented that the technology was much like the "familiar Xerox," highlighting the different expertise and normalcy associated with scanning technologies versus the computer processing used for *Nude*—even if at the time both technologies were actually not that disparate, with *Nude* similarly employing scanning, photography, and sewing.[66] Another article responding to Schjeldahl's critique, further emphasized the different standards applied to *Nude* and *Man-Scan*, stating "I'm not sure I understand the difference between the 3M systems and those 'Spin-'Art'' machines at carnivals which, by combining chance and centrifugal force, give you 'your very own abstract painting in just seconds.'"[67] As with the reference to craft work in one of the private letters, familiar gendered conceptions of work in art, in contrast to craft, structure the reading of Sheridan's work, prohibiting the same status of mastermind given to Knowlton and Harmon. Like early female programmers, Sheridan's work was seen as definitively manual and therefore not high-minded, despite its equally intensive technological investment and its arguably more rigorous conceptual goals compared to those of *Nude*.

Given these reactions, it is unsurprising that the MoMA show negatively impacted all areas of her career, highlighting the different standards of mobility across disciplines afforded to Sheridan. The negative reviews further troubled her relationship with SAIC and her artistic practice.[68] With their company logo and information printed all over the exhibition's material, 3M was very displeased—even though Dybvig had been an active aide in creating the works for the show. Dybvig, Sheridan, and Conlin noted the huge difference in treatment Sheridan received compared to images like *Nude* in engineer and industry culture: "Negative reviews by art critics and male nudes shown on 3M materials at the MOMA do not sit well with industrial publicity departments (which can overlook pornographic images passed out at industrial conventions—as long as they are of females)."[69] Sheridan was able to continue working with 3M, but *Man-Scan* highlighted just how precarious this relationship was. Not long after, in 1975, Color in Color machines were removed from the market altogether by 3M, having been edged out by Xerox, whose machines by that point were also able to produce colour

65. Fred Guber, *Letter to Miss Grace Mayer, Department of Photography* (manuscript), 1974, MoMA Exhibitions, 1063.3 New York, NY. The Museum of Modern Art Archives.

66. Schjeldahl, "The Sheridan-Smith Show," 127.

67. Adele Coleman, "Of Snapshots and Mechanizations," *New York Times*, July 14, 1974, 120, https://search.proquest.com/hnpnewyorktimes/docview/120102358/abstract/D8631D65111446EDPQ/1. Accessed September 14, 2018.

68. Thompson, *In Time*, 2.

69. Ibid., 3.

Figure 3. Sonia Sheridan, *"Man-Scan" with Keith Smith*, 1974. Process: Color-in-Color; 1 slide: col.; 35 mm. The Daniel Langlois Foundation for Art, Science, and Technology, Sonia Landy Sheridan fonds. Courtesy Daniel Langlois Foundation and Cinémathèque Québécoise, Montreal.

copies, but at a much lower cost.[70] This drastically altered 3M's support of Sheridan and her "Generative Systems" program. Combined with her already fraught funding relationship with the SAIC, Sheridan went into early retirement in 1980. In a somewhat ironic end, Sheridan passed on her program to Gregory Gundlach—the son of one of Xerox's head inventors.[71]

Concluding Remarks

Examining the specific context that produced *Nude* and *Man-Scan*, as well as their reception, draws attention to emerging media as an on-going site of negotiation between social, cultural, and technical relationships; a connection which must be considered for art historical scholarship looking towards art and industry partnerships. Although both nudes were produced less than ten years apart from one another and utilized new technologies, the manner in which they were received by various publics differed quite significantly. For Knowlton and Harmon, what started off as being labeled illicit material burst into a lucrative beacon of (supposed) human technological mastery over the computer, swept up and supported by E.A.T. Meanwhile, for Sheridan, her intentions of humanizing scanning technology through the development of process-oriented portraits, came under scrutiny for its (supposed) dehumanization and alienation of the body. In both cases, the oscillation between "humanizing" or "alienating" was deeply rooted in the treatment and selection of the human form in relationship to dominant narratives of gender and industry.

Relatedly, it is also a conversation about authority and recognition, extending not only to the production of the portraits, but also which industries and institutions support and claim them. Each case represents a cross-disciplinary project, moving in between research and development labs in large corporate technological complexes and art institutions. Comparing each context of collaboration and co-production reveals how they were both deeply engaged in the task of re-uniting the divided "two cultures" of the humanities and sciences, famously highlighted in C.P. Snow's 1959 Rede lecture.[72] However, the treatment and legitimacy afforded to each case varies considerably and highlights a story of the gendered labour of technological experimentation and our histories of technology. While Knowlton and Harmon are recognized as creators of the first computerized nude portrait, Sheridan remains comparatively obscure, illustrating another case in which women's innovation and experimentation with technology has been overlooked in the historical record. Further, the different narratives around scanning machines versus computers compounded the disparate standards of expertise assigned to each nude's production, paralleling a long history of gendered hierarchies in labour tasks in computer and industry workspaces, as well as art spaces. Particularly for Sheridan, these case-studies make visible gendered labour relationships and their effect on public recognition, which finds parallels in the under-represented status of women in the history of technology more broadly. ¶

70. Patrick Firpo et al., "Preface," *COPYART the first complete guide to the copy machine. Turn your local copier into a personal arts and crafts center. Make personalized, inexpensive greeting cards, T-shirts, fabrics, presentations, prints, and much, much more. (plus a portfolio of COPYART by artists working in this exciting, new medium.)* (Houseguard Lane Productions, Ltd., 1978), 11.

71. Sonia Sheridan, *Letter of Retirement to Dean Roger Gilmore* (manuscript), 1980. Sonia Sheridan Fonds, Research and Teaching Activities, B14 0501 -140, Montreal, QC. La Fondation Daniel Langlois Pour l'Art, la Science et la Technologie.

72. C.P. Snow, *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1962), 1–50.