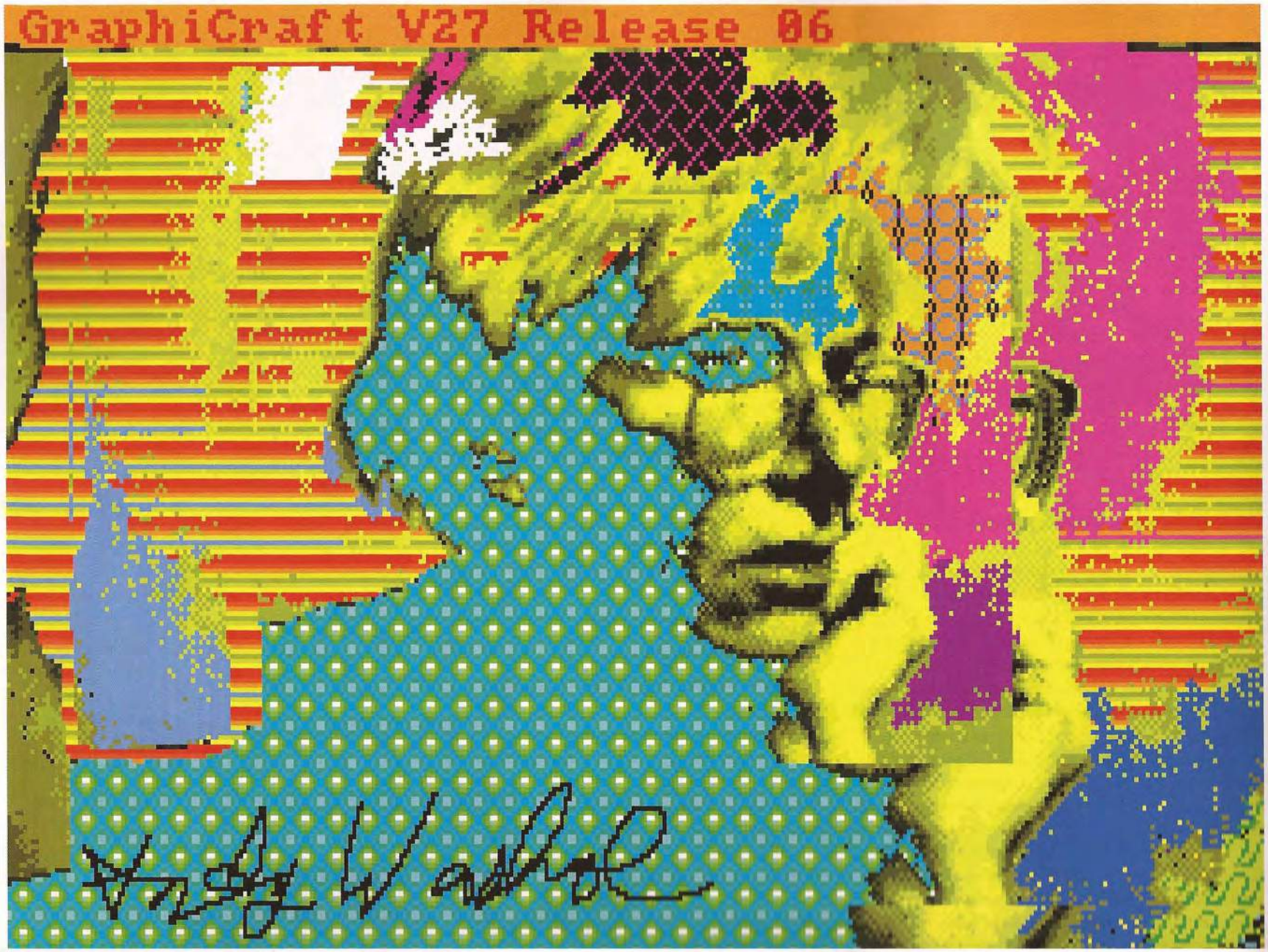


The Warhol Files

CORY ARCANGEL ON ANDY WARHOL'S LONG-LOST COMPUTER GRAPHICS

Opposite page: **Andy Warhol, *Andy2*, 1985,** digital image.

Above: **Andy Warhol, *Intro2*, 1985,** digital image.

I HAVE A MAJOR BEEF with the application of physical terms to new media. I was reminded of this recently while reading a headline on the computer-news website CNET: "Facebook Delivers Paper to iPhone." Consider a slightly edited reprisal of this headline: "Book, Paper, Phone." And never mind the fact that these anachronistic terms are being used to describe a social network creating a new app (called Paper) for a mobile digital device. Or consider the term *cloud*, which is used to give some semblance of natural physicality to the invisible Wi-Fi vapor that stores our e-mails and sends our JPEGS across the globe.

The term that really drives me up the wall, though, is *web page*. *Page* connotes something stable, unchanging, and definite. A book page exists. A book page *is*. A web page, on the other hand, is a vastly more complicated structure. It is a set of instructions blasted from a server farm across the globe through fiber-optic cables, then interpreted by a computer's hypertext transfer protocol browser and displayed by

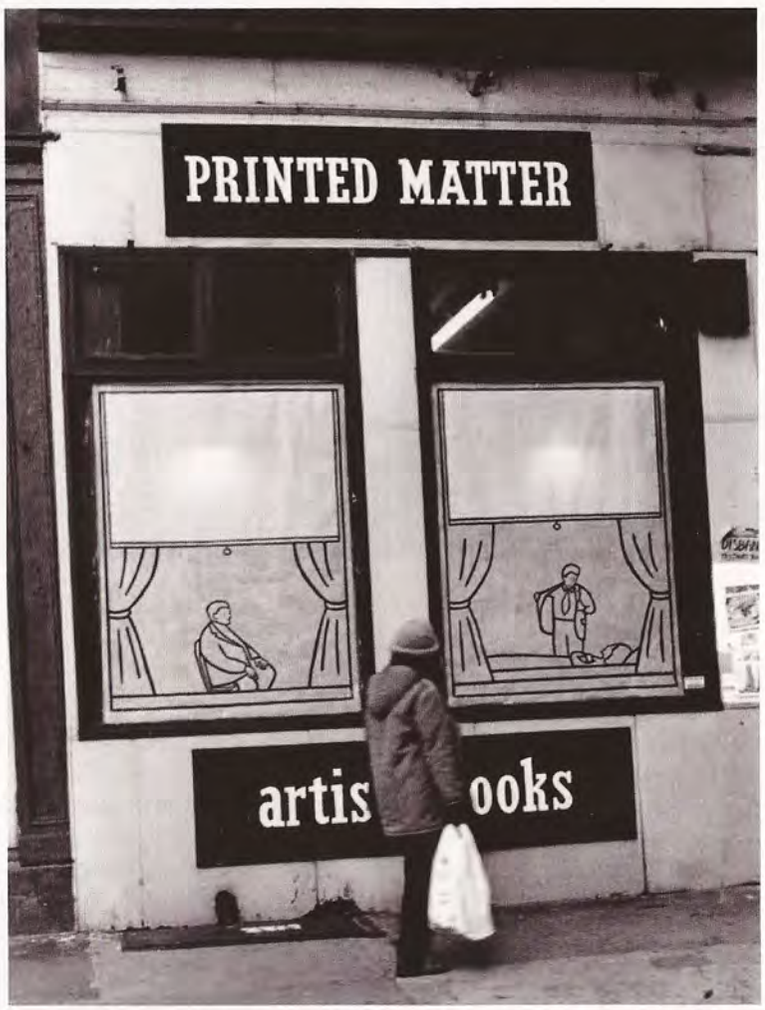
IDA APPLEBROOG

EQUATING COMICS with "high art" is not as odd as it may sound. Both deal with the abstract transformation of information into another form without a fixed set of rules. And there has always, in fact, been a connection between the two—think of George Grosz, Andy Warhol, Laurie Anderson, and, best of all, Marcel Duchamp. Of course, Duchamp's iconic *Fountain*, 1917, was signed "R. Mutt"—a name derived from the popular comic strip *Mutt and Jeff*. The urinal, an unexpectedly beautiful art object, provoked the question: If it's funny, can it be art?

For me, making this kind of art is crucial. As with comics, my work is a microcosm of the world we live in. I raise issues of politics and gender in a seemingly nonthreatening way, subverting traditional subject positions. For instance, I use generic faces, without linear narrative—there is no beginning or end. A viewer enters in the middle. It's a do-it-yourself Rorschach.

Trained in graphic design in the 1950s, I learned to get a message across fast. I was influenced by a range of sources, including Francisco de Goya, Käthe Kollwitz, John Heartfield, Samuel Beckett, and the graphic novels of Lynd Ward. In the '70s, my style came out of Minimalism, Conceptual art, book art, performance, activism, and feminism—movements that tried to make art ordinary. My work at the time included stagings of minimalist cartoon storyboards, which became more and more multilayered and multipaneled. In 1980, Lucy Lippard asked me to make an installation for the Printed Matter storefront in New York (then on Lispenard Street in TriBeCa) as part of a curated series of window exhibitions. I placed two panels in the windows; one featured an elderly man who was watching a couple getting ready for bed, pictured in the next window. The presentation itself was enigmatic, but the street-level installation forced viewers to become involved in a more complex way of seeing than that of the usual, passive, window-shopping spectator. As a viewer unwittingly came upon the piece, the element of surprise intensified the humor in the work. □

IDA APPLEBROOG IS AN ARTIST BASED IN NEW YORK.



Ida Applebroog, *Independence Plaza*, 1980, ink and Rhoplex on vellum. Installation view, Printed Matter, New York.

a light-emitting-diode screen. All this, by the way, is happening in real time—reconstituted at each millisecond through a unique and contingent tangle of systems—and is supported by the constant churn of the power grid, itself (incredibly) still commonly powered by burning coal. So instead of *web page*, I'd prefer the term *web performance*, which would remind us that this information is both immediate and ephemeral. In a sense, it is thousands of coal-powered virtual Rube Goldberg machines—lined up from end to end—that power our Facebook Paper apps on our iPhones.

This structure isn't specific to the Web. Anything that is displayed on a monitor exists as the result of a kludge of real-time networks executing instructions. And keeping all these ad hoc systems running is a formidable task: It means unplugging your home router, waiting ten seconds, and plugging it back in; spending half a day waiting at the Apple Store's Genius Bar; shedding tears over a lost hard drive; or frantically searching for a public electricity outlet to recharge an iPhone that's at 7 percent battery power. These are the things we do to wage the never-ending war of "uptime"—of keeping our gizmos working and available. And these are best-case scenarios involving the latest technology, which, difficult as they may be, are all lubricated by the tailwind of capitalism! This same tailwind causes casualties, too, making it easy to buy a power adapter for the latest iPhone but at the same time leaving us with a drawer full of other adapters for older Apple products that don't work anymore—that have been forced into obsolescence. As culture itself becomes increasingly digitized, more and more of it will end up in drawers like this—discarded, forgotten, and inoperable.

THIS INTEREST in digital obsolescence brought me to an unlikely place: In 2011, I found myself knocking on the door of the Andy Warhol Museum in Pittsburgh. I was in the city visiting the Carnegie Museum of Art, where I had been invited by curator Tina Kukielski to do an exhibition opening the following year. The trip to Warhol's hometown, now the site of the museum that bears his name—a sister institution to the Carnegie—offered the perfect opportunity to follow up on a few questions involving digital decay and Warhol's relationship to it, questions that had been bouncing around my head for a several years. Specifically: Did Andy Warhol really have an Amiga computer, as I had long heard rumored? If so, what had happened to his disks, and had anyone ever looked at them?

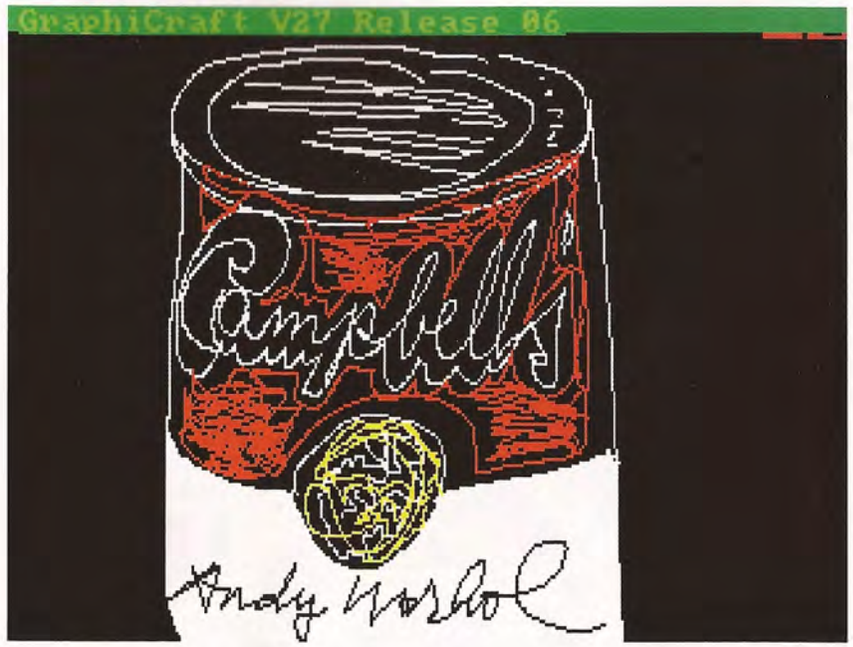
Warhol *did* have an Amiga—the classic mid-1980s personal computer known for its early use of color, sound, and animation. His disks, now part of the Warhol Museum collection, were stored with

an assortment of his AV gear in the same cardboard boxes in which they had been packed at the Factory, after his death. A few other disks have been spotted over the years (one interesting and notable case is a disk in the possession of Don Greenbaum, former CFO of Commodore International, who worked with Warhol directly on the launch; the disk contains nine files that have never been published). But because of museum protocols, and the sheer, mind-boggling number of objects Warhol left behind—he was a hoarder, after all—no effort had previously been made to access the data on the disks in the Warhol Museum's collection.

There couldn't have been a better place than Pittsburgh in the 2010s for Warhol's forty disks and assorted Amiga peripherals to be lying around. Because, just across downtown, piled high in a tiny machine room in the basement of an unremarkable IT department building on the Carnegie Mellon University (CMU) campus, is a similar stash of outmoded computers and hardware. The stash, which includes such long-forgotten machines as VAXens, DECstations, HP9000s, and SPARCs—curiosities that will be familiar to only the most hardened sysadmins—is one of the largest actively used retrocomputing collections in the US. It is maintained by the CMU Computer Club, a student organization known for its expertise in running outdated hardware and programming in archaic languages. At CMU, more students fly experimental drones in the quad than play Frisbee on a spring day, so it should come as no surprise that a popular hobby is tinkering with old computers. I was put in touch with the club by the Frank-Ratchye Studio for Creative Inquiry, a campus organization that connects artists with university resources. Once the introduction was made, I paired up the Computer Club with the Warhol Museum, and together we embarked on a multiyear, multi-institution effort to study and preserve Warhol's disks, with additional support from the Hillman Photography Initiative at the Carnegie Museum of Art and the Studio for Creative Inquiry.

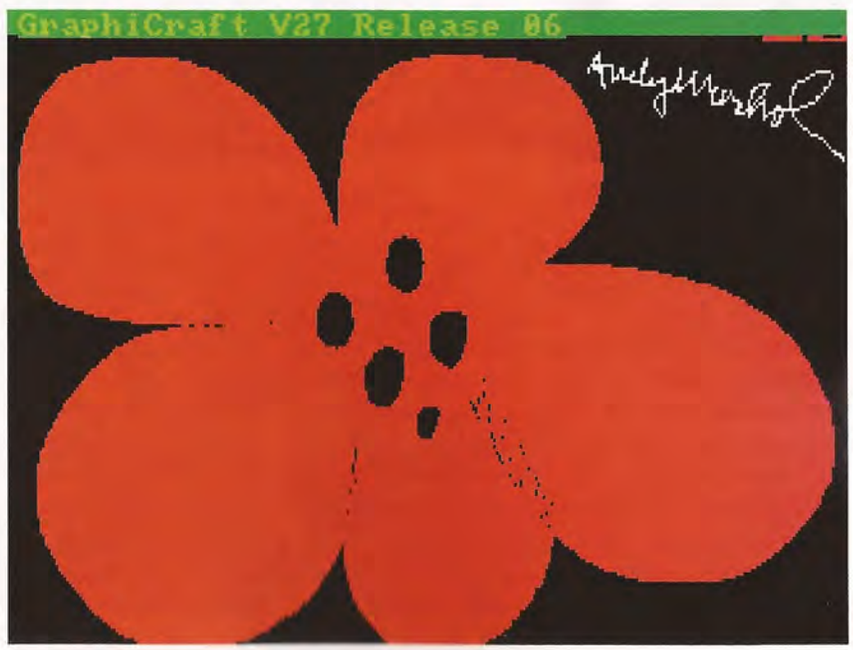
IN A 1986 INTERVIEW in *AmigaWorld* magazine, Warhol was asked, "Do you think that computers will play a larger and larger role in art?" He responded, "Uh, yeah, I think that after graffiti art, they probably will. When the machine comes out fast enough. It will probably take over from the graffiti kids." It's hard to draw a straight line between graffiti art and the computer-saturated present, but Warhol's premonition proved salient. There *is* a relationship between graffiti and early digital expression. In fact, the rescue effort that made possible the publication of the images in these pages wouldn't have been possible without a type of '80s digital graffiti known as "the intro."

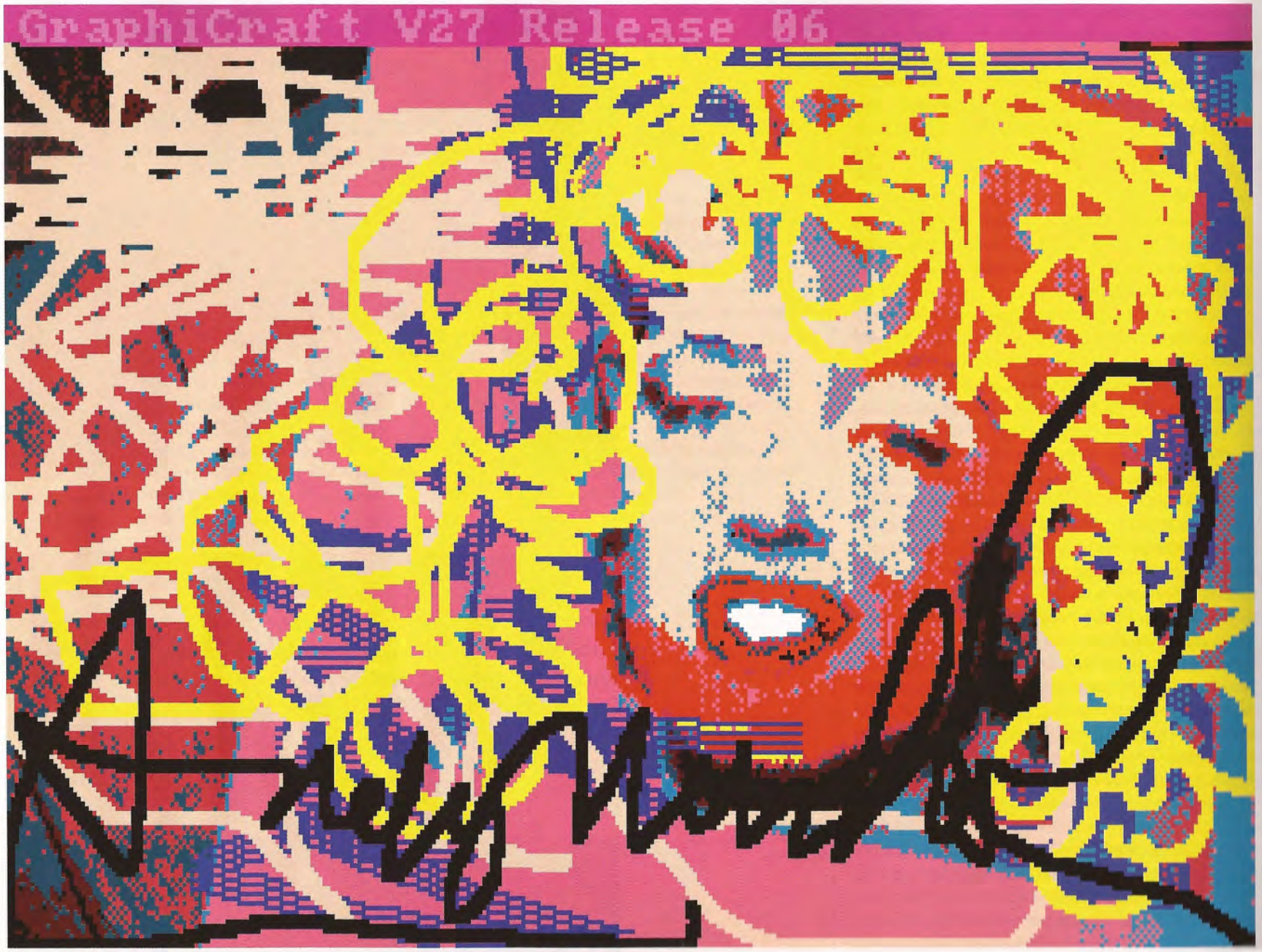
Andy Warhol, *Campbells*, 1985, digital image.



Did Andy Warhol really have an Amiga computer in the 1980s, as I had long heard rumored? If so, what had happened to his disks, and had anyone ever looked at them?

Andy Warhol, *Flower*, 1985, digital image.





Andy Warhol, *Marilyn1*, 1985, digital image.

Intros are small, real-time graphics-and-sound presentations that load when you start up software that has been "cracked." They once served as a form of bragging for the crew or individual responsible for both distributing the software (mostly video games) and liberating it from copy protection. In their '80s heyday, intros developed a visual vernacular. They often featured the logo associated with the programming crew, bouncing graphics, and scrolling text. The last typically listed members of the crew, offered greetings to sympathetic crews, and even contained threats to rivals. The intros were traded via bulletin board systems (proto–social networks accessible via phone lines) and snail mail, and at IRL copy parties. Intros were the computer-nerd version of graffiti. As Linus Walleij of the legendary computer crew Triad has pointed out, cracker crews "portrayed themselves as organizations as old and powerful as the Freemasons, and their art was just as serious-looking. . . . Intros are graffiti and both intros and graffiti are art. It is graffiti-like in the sense that intro makers want to be seen, and want to belong to something. Just like intro makers, graffiti creators live under the impression of being a part of something much bigger that has been around for ages." In the late '80s and early '90s, intros actually became more popular than the software to which they were attached, and soon individuals and crews began programming standalone intros. These became known as demos, and the demoscene, a wide community of programmers who

In the fall of 2012, the remains of Warhol's Amiga collection were unboxed and evaluated. It immediately became clear that the collection was one of a kind.

specialize in demos, still thrives today. Like intros, demos are real-time graphics-and-sound software presentations, but they exist solely to push a computer to its limits. They are a performative way for programmers and crews to flex their coding skills.

The CMU Computer Club's interest in collecting obsolete machines and acquiring the knowledge to run them started in part with an interest in playing classic demos on period hardware. Given that now-obsolete demos were usually intended to redline the capacity of then-current computers, running them today is a formidable task, requiring an in-depth working knowledge of long-forgotten software and hardware configurations—exactly, as luck would have it, the knowledge required to tackle whatever unknowns lurked inside Warhol's dusty AV boxes.

WARHOL'S AMIGA COLLECTION was the result of a collaboration with Commodore International, maker of the Commodore 64 home computer, who hired the artist to show off its new computer, the Amiga 1000, at its debut. "During this morning [Friday, June 14, 1985] I went down to the Seagram's building for that 'How to Paint' video thing that the computer company, Commodore, wants me to be a spokesman for. And I guess I got the job. . . . It's a $3,000 machine that's like the Apple thing but can do a hundred times more," Warhol recounts in his diaries.

The public result of this "job" can be seen in a great—and well-worn—YouTube clip of the premiere of the Amiga 1000 at New York's Lincoln Center for the Performing Arts on July 23, 1985. Warhol is seated behind the Amiga with his hand confidently planted on a bulky computer mouse. He is manipulating a low-resolution black-and-white photographic image of Debbie Harry, who is seated adjacent to him, as if posing for a portrait. The clip is notable both for Warhol's classic deadpan and for his recklessly abusive use of the flood-fill feature (better known today as the paint bucket). He uses the tool to color Harry's hair yellow, but because the borders of her hair are not clearly differentiated, the yellow spills out into

NICK ZEDD

I MADE *SHAOLIN COMIX* in New York during the '90s with no money, using a ballpoint pen on paper, handing out copies to friends. They were based on the life of a friend named Shaolin, who designed clothes for Peruvian Connection. She would spend hours sitting on the floor of a tiny one-bedroom apartment drawing hundreds of intricately patterned outfits for her boss, who would then remove any trace of originality in order to market knockoffs to people in the suburbs with no taste.

Shaolin had an inferiority complex but was generous with money and paid for limo rides and restaurants, feeding an entourage of hipsters and aspiring rock stars. She let the saddest creatures move in with her, and they'd suck money out of her in delusional, narcissistic exercises of drug-induced decadence. They made great targets for satire, though, so I exposed and exaggerated their hypocrisy with joy. This record of Shaolin's comical misfortunes offers a more truthful portrayal of life in the bars, clubs, and cheap apartments of the early 1990s than do the polite memories and airbrushed reminiscences that some cling to today.

I made these comics with no illusions, only a compulsion to shine a light on that moment in time, a decaying counterculture that those in power were systematically trying to wipe out. □

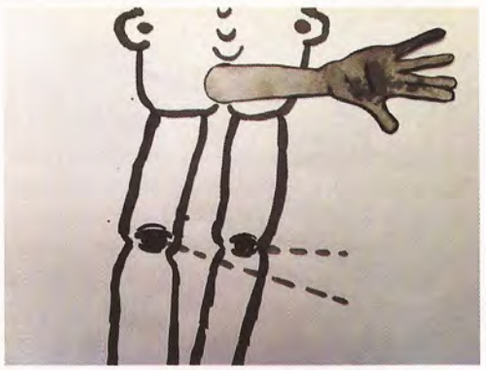
NICK ZEDD IS AN ARTIST BASED IN MEXICO CITY.

Page from Nick Zedd, *Shaolin Comix*, no. 2 (1992).

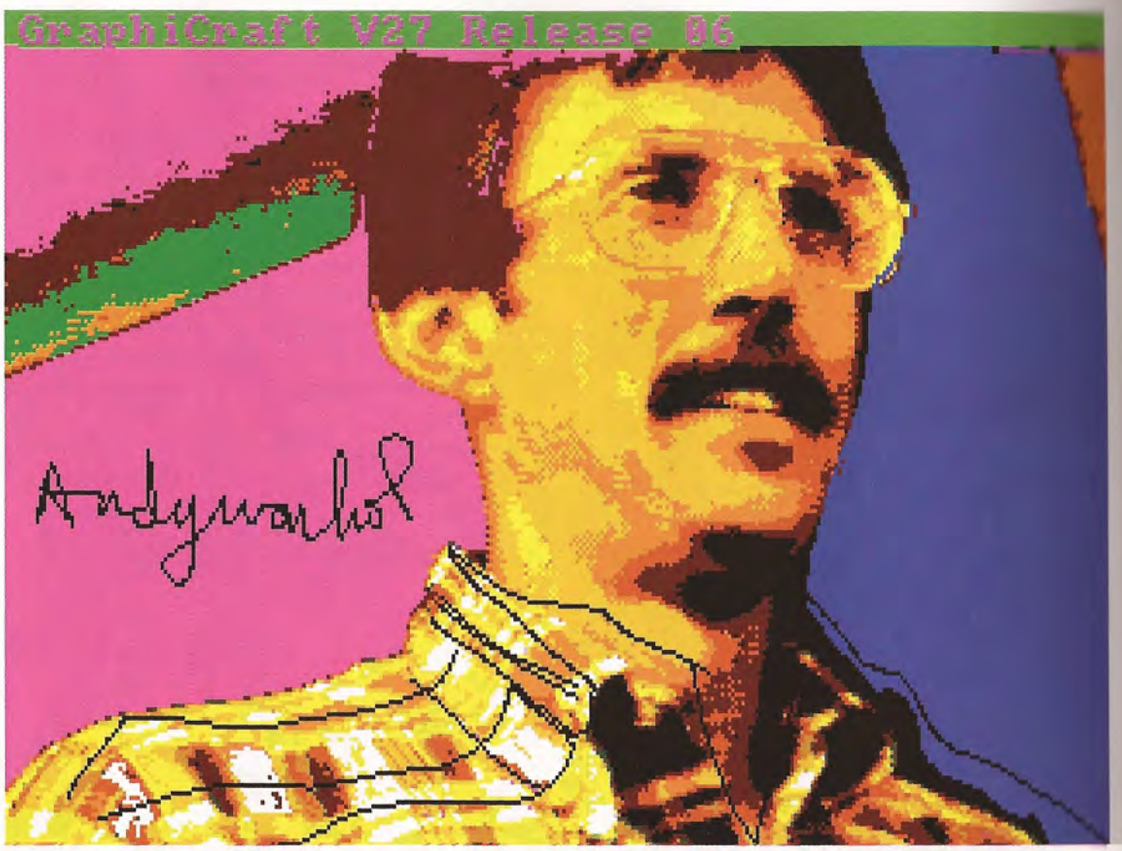
ED HALTER ON AMY SILLMAN

AMY SILLMAN'S animated videos are so deftly constructed, complex, and funny that it's surprising to find out she has been making them for only a few years. But elements of animation had always been lying in wait in her art: in the serial cartoon shapes found in many of her works, in the ziney comic books she has published, and even in the very process of painting as such—which, after all, involves marking a screenlike surface with images that morph, layer, and change as they find final form. Sillman has made this last point of convergence explicit by exhibiting paintings with silent movies looping on iPads mounted beside them. *Thirteen Possible Futures: Cartoon for a Painting*, 2012, appeared first in "Blues for Smoke" (2012–13) at the Museum of Contemporary Art, Los Angeles, where it was shown with *Duel*, 2011, while *PS*, 2013, and an early painting, *Shade*, 1997–98, were paired for her retrospective last year at Boston's Institute of Contemporary Art. *Thirteen Possible Futures* and *PS* were created with free apps on an iPad, and each riffs off its sibling paintings through phantasmagorias of soft-edged finger streaks, color clouds, and spidery stylus lines. In motion, *Sillman's work evokes the rubbery animaloids that* bop through Fleischer Studios cartoons, and the creepy minimalism of 1960s kiddie TV like *Clutch Cargo*. The Freudian theater underlying such fare plays out most overtly in her longest movie to date, the twelve-minute *Triscuits*, 2011–12. Shot on an iPhone but composed of ink drawings, *Triscuits* uses both stop-motion animation and live manipulation, creating a low-tech puppet show about grown-up problems like social awkwardness, maternal memories, and lumpy bodies. □

ED HALTER IS A FOUNDER AND DIRECTOR OF LIGHT INDUSTRY, NEW YORK, AND TEACHES AT BARD COLLEGE.



Amy Sillman, *Triscuits*, 2011–12, digital video, black-and-white, silent, 12 minutes 30 seconds.



Andy Warhol, *Dave*, 1985, digital image.

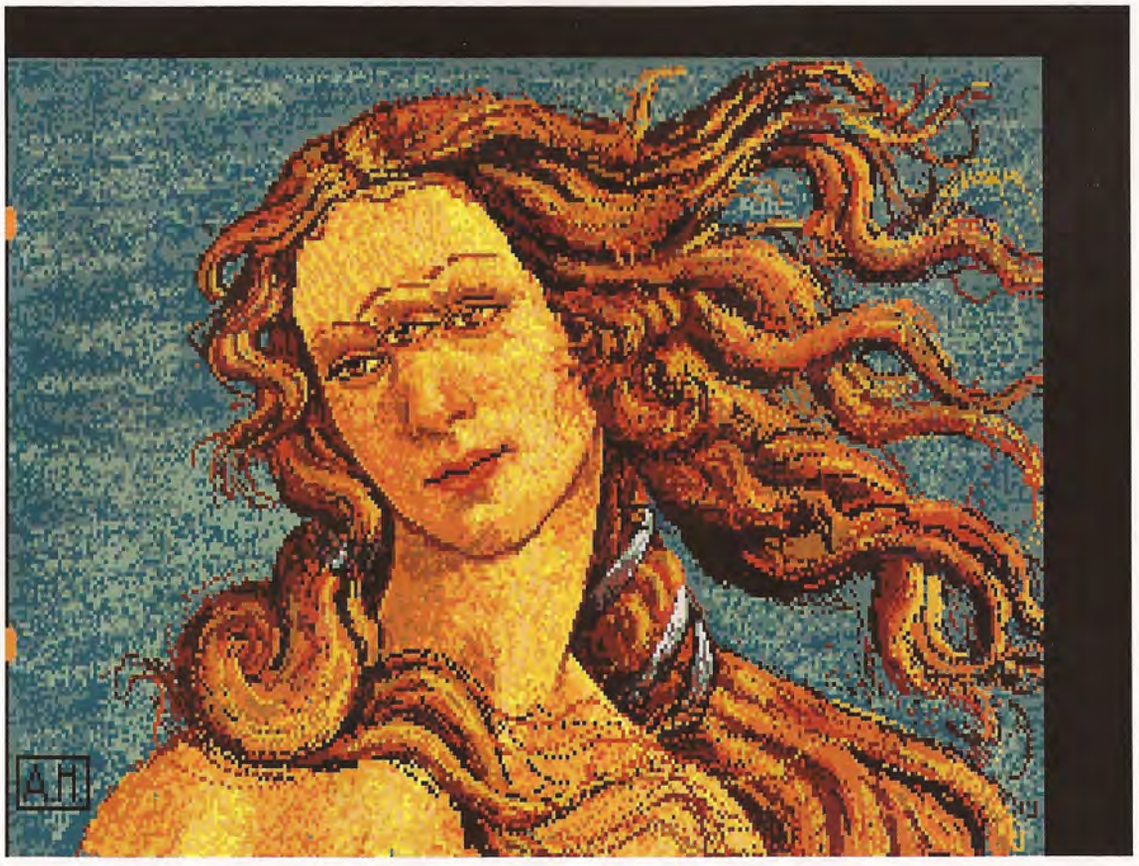
the right-hand edge of the image. After seeing the results of this leaky flood fill, Warhol drolls, "Well, this is kinda pretty. . . . I think I'll keep it. . . . Oh, it's beautiful." Just as Warhol mined the medium of silk screen for its inherent flaws, the video demonstrates that he intuitively understood the computer with a similar sense of sloppily aloof mastery. This is, after all, the artist who mused in a book of his own philosophy, "If you don't think about it, it's right."

To prepare for the event, Commodore provided Warhol with various pieces of Amiga software and hardware, which he presumably practiced with in his studio before his public performance at Lincoln Center. Yet only one known artwork resulted from the collaboration: the portrait of Harry that Warhol is seen working on in the video. An IRL version of the work, a photograph of the image on an Amiga screen, is in the Warhol Museum's collection.

Given the hunch that his disks might contain other Amiga works, or at least contain an interesting window into the history of the Amiga, our team began a preservation and recovery initiative. In the fall of 2012, the remains of Warhol's Amiga collection were unboxed and evaluated by the CMU Computer Club at the Warhol Museum. It immediately became clear that the collection was one of a kind. The main hardware in the collection consisted of two Amiga 1000s (though one, still wrapped in plastic, had apparently never been used), an incomplete video-capture setup, and an early drawing tablet. Many of the items had shipping labels directly from Commodore, and several had Commodore labels warning that the components, which lacked FCC approval, were not for sale. At first, we didn't know whether there would be any files of interest on the floppies, because all but a single disk appeared to be commercial software. The team's initial assumption was that if Warhol had made additional files, they would have been stored on personal disks, presumably labeled along the lines of ANDY'S STUFF, ANDY'S DRAWINGS, etc.—things they did not find, and that had apparently been lost to history if they ever existed at all.

Despite this initial disappointment, there was still interest in examining the contents of the discovered disks—after all, "hacking on nifty programming projects" is how the computer club advertises its regular weekly sessions. Several months later, lugging a vast array of equipment—including several floppy

"I went down to the Seagram's building for that 'How to Paint' video thing that the computer company, Commodore, wants me to be a spokesman for. And I guess I got the job.... It's a $3,000 machine that's like the Apple thing but can do a hundred times more," Warhol recounts in his diaries.



Andy Warhol, *Venus*, 1985, digital image.

drives, boxes of floppies, an Amiga 500, an Amiga 1200, a prototype Amiga-to-LCD-monitor adaptor, and a specialized recovery device called a KryoFlux—the club returned to the Warhol Museum to make archival copies of the disks. The KryoFlux was the key tool in this effort. It is a USB-attached drive controller developed by the Software Preservation Society, which hooks up to a modern PC and reads floppy disks in the most thorough way possible: by recording the raw timing between their magnetic flux transitions. This ensures that every last piece of data on a given disk is copied and preserved, even if the data itself is no longer readable. Even deleted files, as long as they haven't been written over by new files, can be read. Warhol's dusty boxes turned out to provide ideal storage conditions, and the floppies were in surprisingly good shape. One by one, each—handled exclusively by the Warhol collection manager—was fed into a drive controlled by a KryoFlux, providing the club with an exact virtual copy, ensuring that the disks never needed to be read or touched again.

The next night, the club, virtual Warhol disk files in hand, started the final research-and-preservation phase of the effort—the hacking. Soon, with great fanfare, the file names "flower.pic," "campbells.pic," and "marilyn1.pic" were spotted. Although the files could not be opened at the time, the discovery proved that there *were* Warhol experiments to be explored and preserved. The hacking effort spread out over the next few months, and eventually the club prepared a report for the Warhol Museum. Of the forty disks that were archived, ten had Warhol-added files. Nine of the twenty-plus image files found have been rendered for print by the club and are reproduced here.

To create these images, Warhol used the drawing program GraphiCraft, a bitmap drawing application originally developed by Island Graphics and later released by Commodore. Warhol's copy of GraphiCraft (which he can be seen using in the film of the Lincoln Center launch; there the software was temporarily renamed "Pro Paint" for publicity purposes) was such an early version that it gave us a few surprises. The first was that the software did not allow images (or "paintings," as the files were referred to in GraphiCraft code) to be saved on other disks. This was why Warhol had no personal disks for saving his images; his only option was to save his files on his GraphiCraft disks, scattered among various executable and run-time files. The second surprise was that Warhol's images were saved in a completely unknown file format. Luckily, the club eventually reverse-engineered the encoding, finding that it was nearly identical to an archaic image format called PLBM, or planar bitmap. The third surprise, one that manifests visually, was that the "save" function on Warhol's GraphiCraft didn't seem to be finished. So to save a drawing, the program simply dumped the Amiga's video RAM to disk, leaving the menu of the program visible in the images themselves—LOL!

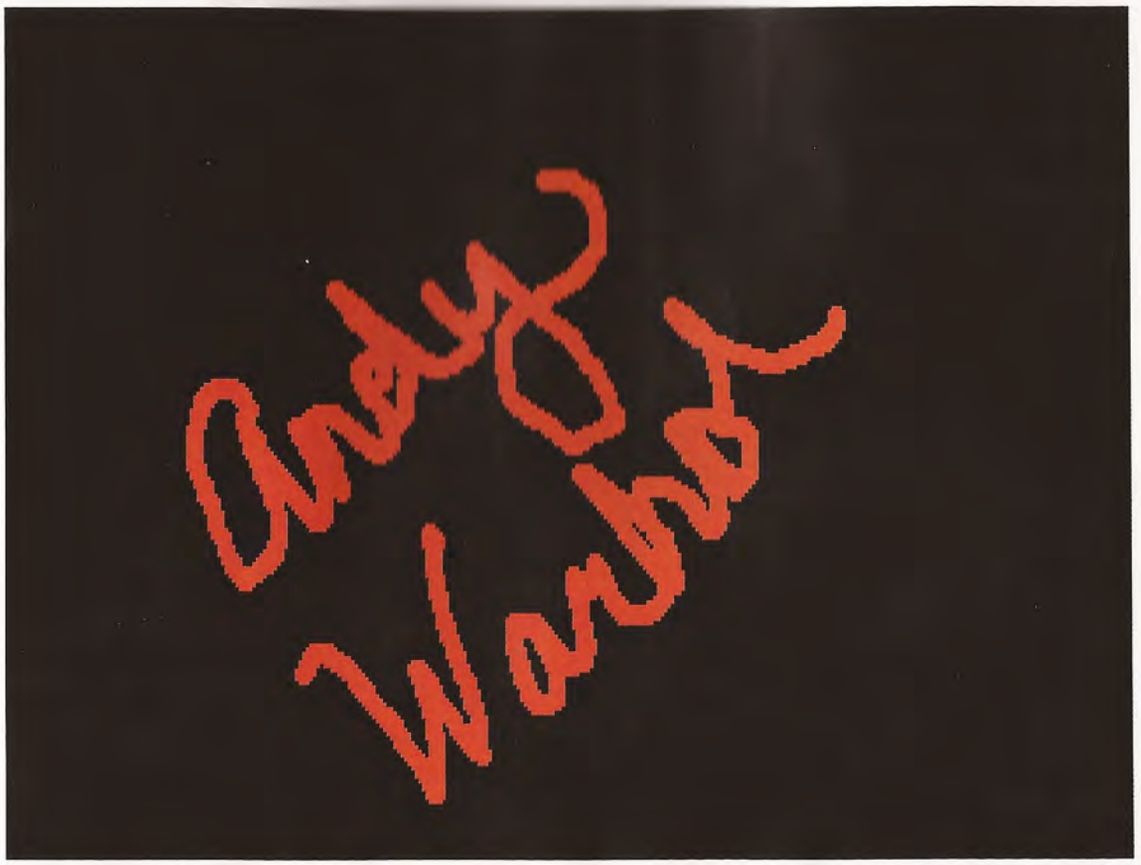
It is unclear whether Warhol drew these images with a mouse or a drawing tablet, though he had the capability to do both—among his collection were all the components and software needed to input to the Amiga via an Easyl drawing tablet, an early pressure-sensitive tablet with a wood base. It's also impossible to tell exactly when Warhol made these drawings, but the files do come with time stamps. Consider the following for three files found on the same disk: "marilyn1.pic 05-Jul-85 03:23:30," "flower.pic 05-Jul-85 03:29:41," "campbells.pic 05-Jul-85 03:19:12." For these time stamps to be accurate, the

Just as Warhol mined the medium of silk screen for its inherent flaws, he intuitively understood the computer with a similar sense of sloppily aloof mastery.

clock on Warhol's Amiga would have had to be set correctly. His diaries are quiet about what he did on Friday, July 5, 1985, but my guess is that it is unlikely he was up at three in the morning working on his Amiga (even if these are typical hacker hours). Yet we can still learn some valuable things from this information. For example, if we assume he did create all three files on the same machine, we can conclude he winged these drawings out within ten minutes of each other. And assuming the date on his computer was at least close to accurate, we can suppose he drew these three drawings a few weeks in advance of the launch of the Amiga 1000. I suspect that Warhol, whom I tend to think of as the nervous type, was doing his homework.

I ONCE HAD the pleasure of hearing a historically informed performance of a Bach sonata played on an organ made by master builder John Brombaugh. Brombaugh organs are tuned in what is called unequal temperament. It is a bizarrely little-known fact, but today's tuning standard, equal temperament, is a relatively modern system. To hear Glenn Gould plunk

Andy Warhol, *Andy1*, 1985, digital image.



Andy Warhol, *Andy*, 1985, digital image.

away at Bach on a piano is a historical goof. Today, if confronted with Gould performing his music on a contemporary instrument, Bach would most likely wonder, "Why is this Canadian guy playing my compositions out of tune?" Like computer software, music is a set of instructions performed in real time on various instruments, and like all technologies, parts of these systems can become obsolete—even something as common as what we hear as C major. Moreover, technology—like taste—does not necessarily proceed in a straight line. If we traveled back to the 1700s and heard Bach play, we might just as easily ask, "Why is he playing his *own* stuff out of tune?" Hierarchies of authenticity might be best considered relative.

A historically informed setting for the images discovered by this preservation effort would dictate that the following real-time systems be strung together: Warhol's images would be need to be visualized in real time and in real space by a period-specific, analog, cathode-ray-tube Amiga monitor hooked up to an Amiga 1000 running the specific version of GraphiCraft found on Warhol's disk, booted using Amiga Kickstart 26.7, all running on US 110 V, 60 Hz power. This is the only performance of these sketches that would be 100 percent accurate to 1985. The images you see reproduced here are renderings of the raw digital files for contemporary print and Web—a Gould version, if you will. Luckily, though, we might be on the right track, because the performance of these images is not entirely limited to a given medium, technology, or period, any more than an image can exist as a true original, as Warhol knew better than anyone. In 1986, when asked how he would like to see his sketches displayed, Warhol replied, "Well, we could get a printout. I could just print this out if we had the printer." I hope he would have been OK with making a few thousand copies. □

CORY ARCANGEL IS AN ARTIST BASED IN BROOKLYN, NY. (SEE CONTRIBUTORS.)

IAN CHENG

IN MY ANIMATED SIMULATION *Thousand Islands Thousand Laws*, 2013–, a video-game gunman, a flock of herons, and an island of plants endlessly mix and mutate—not only in shape and behavior but also in status: as protagonists, as extras, as props. The camera moves through the simulation like a nature documentarian, uncertain as to what is truly of interest in the frame, hedging on every emergent story. It learns to focus on small disruptions, where lines of influence are revealed and status gets reshuffled. A "who" becomes a "what," figure becomes ground, noise becomes information. The only stable view is of change itself.

What are cartoons in the era of big data? Artificial models to play with complexities that our mental models—enforced by reflexes, emotions, habit, memory, language—cannot grasp alone. At the risk of caricaturing the awe of the world, cartoons can squash and stretch deep-rooted causal chains and freely reframe part-to-whole perceptions in a nauseating *Powers of Ten* zoom. Can we self-stimulate human evolution in order to render nonhuman-scaled complexities thinkable, even feelable? Cartooning to mutate consciousness is the premise of my recent work. □

IAN CHENG IS AN ARTIST BASED IN NEW YORK.

Ian Cheng, *Thousand Islands Thousand Laws*, 2013–, ongoing digital live simulation.

Ian Cheng, *Metis Suns*, 2014–, ongoing digital live simulation.