Art critic Jerry Saltz is regarded as a pioneer of online art criticism by the mainstream press for tweeting [1] and “Facebooking” [2] his art commentary. There are an increasing number of apparently successful online art critical entities, including Modern Art Notes [3] (blog established 2001; podcast established 2010), ArtFCity [4] (established 2005) and Hyperallergic [5] (established 2009). There is also a growing level of discussion of what online art criticism is. This ranges from art critic James Panero’s controversial 2010 article “My Jerry Saltz Problem” [6] to art critic and curator Orit Gat’s “Art Criticism in the Age of Yelp” (2013) [7] and the flurry of other articles [8] published in the runup to the three-day conference Superscript: Arts Journalism and Criticism in the Digital Age, cohosted by the Walker Art Center and MNArtists, Minneapolis, in May 2015 [9]. Yet all these discussions imply that online art criticism is a product of the read-write/Web 2.0/social media age. Far preceding the art discussions on Twitter, Facebook, etc. were networked art projects and art critical bulletin board systems, email discussion lists and blogs. Although there have been studies of independent print-based arts publishing [10], online art production [11] and electronic literature [12], there have been no histories of online art criticism. Even the 2013 publication An Introduction to Art Criticism: Histories, Strategies, Voices only briefly mentions the likes of Rhizome, Afterall Online, artcritical, Modern Art Notes, CultureGrrl and Culture Monster [13].

It is my assertion that there have been three ages of online art criticism. The first used pre- and early-Internet protocols to extend the experimentation happening in independent galleries and publications; the second was characterized by a boom in email-based discussion lists and an intense critique of digital culture; and the third, which we are currently witnessing, sits atop and reflects the fast and furious culture of social media exchange. In this article I will describe a set of early platforms from ARTEXT to Arts Wire in order to begin to account for the origins of the first wave of online art criticism. It is not my intention to provide an analysis of the nature of early online art critique or offer a typology of styles [14]. Rather my aim is to account for this era of activity and prepare the ground for future analyses—perhaps like literature theorist N. Katherine Hayles’s survey of genres of electronic writing in her now-classic book Electronic Literature: New Horizons for the Literary [15]. Eventually it might convincingly be argued that art criticism is becoming more of a hybrid form—often open or participatory, fast-moving and able to generate somehow “living” or iterative documents on the arts—but first of all we need to uncover the real history of online art criticism.

INDEPENDENT ART PUBLISHING

Immediately preceding online art critical platforms were various experimental publications. Just like their café-culture counterparts, Modernist art magazines had provided an important discursive forum for complex new art styles. Important publications of the era included Cabaret Voltaire (1916), Dada (1917–1921), De Stijl (1917–1932), Merz (1923–1932) and Minotaure (1933–1939). However, although these publications undoubtedly promoted an experimental approach, art historians Gwen Allen and Clive Phillpot argue that it was not until the 1960s and 1970s that independently produced arts magazines themselves became truly conceptual [16]. During this time, artists not only revolted against established modes of making and display but also produced works that required

Charlotte Frost (art historian), School of Creative Media, City University of Hong Kong, Centre Level 7, 18 Tat Hong Avenue, Kowloon Tong, Hong Kong. Email: charlotte@digitalcritic.org.

See www.mitpressjournals.org/toc/leon/52/1 for supplemental files associated with this issue.
additional explanation and documentation. This new breed of art publication started with publications like Diagonal, Cero, Gorgona and Spirale, which were produced in short print runs of a few hundred copies and often seemed as fleeting as some of the performative and conceptual artworks to which they related.

More famously, Avalanche, which was published between 1970–1976, established itself as a unique venue for demonstrating conceptual and time-based arts. Part publication, alternative space and community hub, Avalance was based in the center of New York's SoHo district as it began to emerge as a cultural enclave. Rather than publishing what was strictly considered “art criticism,” Avalanche featured interviews and a variety of different forms of art documentation. Not only did it represent artworks and time-based performances or installations through photographs and written documentation, but artists could publish a set of instructions that the reader—and now artist—could use to create a performance themselves. Even more conceptual might be the use of type or other markings to demonstrate the passage of time or a particular gesture. In this way, the magazine was not just talking about art, it was (re)acting and responding to it.

Central to the remit of publications like Avalanche was the idea of giving artists a voice equal to, if not louder than, the art critic’s. This was a time in which many initiatives such as the Art Workers' Coalition and feminist approaches to art history sought to rebalance art-world power structures. The in-depth interviews conducted by Avalanche’s founders, editor Liza Béar and artist and art historian Willoughby Sharp, show this shift of power and are often regarded as the magazine’s most important legacy. Despite the fact that, as published, the interviews seem so conversational as to be unedited, Allen explains that meticulous editing was done in order to “preserve each artist’s idiom” and to provide “an authentic channel for the artist’s voice” [17]. Like the alternative art spaces of the same era (for example: Apple, Gain Ground, 98 Greene Street, 3 Mercer Street Store, 112 Greene Street, the Institute for Art and Urban Resources, Artists Space, Creative Time, The Kitchen, The Alternative Museum, Franklin Furnace, Printed Matter, The Drawing Center, the New Museum and Fashion Moda), the magazine offered important new physical and political dimensions for exploring creativity. It is perhaps unsurprising that the expansion of communication and publishing technologies wrought by the Internet and the World Wide Web would further extend and remix these independent projects.

ARTEX

Today’s well-established Web belies the fact that the U.S. Department of Defense’s 1967 ARPANET was initially just one cyberspace among many. For example, I.P. Sharp Associates (IPSA) was a pioneering Canadian computer company founded in 1964 that developed time-sharing capacities and provided alternative communication networks while the Internet (and even Usenet, another computer network developed by universities initially excluded from ARPANET’s connection) was still largely populated by researchers and academics. With an eye for creative development, they decided to provide artists such as Norman White with access to their network to explore the creative possibilities of a networked culture. White instantly saw the potential in their email system, Mailbox, for extending some of the popular networked mail art projects that had previously taken more concrete form [18]. He went on to discuss the potential of the IPSA network with artist Bill Bartlett, who had been working on a collaborative network he had established with other artists using Slow Scan TV (SSTV). As White and Bartlett, and soon artist Robert Adrian X, enthused about the creative and economic benefits of online communication, they developed a project to showcase their ideas at the Computing Cultures conference held in Toronto in 1979. Known as Interplay, it was an exchange-based art project supported by IPSA offices around the world (which already offered Mailbox access to local artists). These artists saw the value in creating a hybrid platform somewhat akin to Avalanche by developing a networked discussion/performance/collaboration/exchange. Continuing in this way, IPSA released a cheaper version of Mailbox to artists and, collaborating with the Vienna office of the company, artist Robert Adrian X and IPSA programmer Gottfried Bach began to develop a platform originally known as ARTBOX in 1980 and as the Artist's Electronic Exchange Network project, ARTEX, by 1983.

ARTEX involved creating an “intercontinental, interactive, electronic art–exchange program designed for artists and anybody else interested in alternative possibilities of using new technologies” [19]. Adrian lists its functions as: 1) an email communication program for artists; 2) an organisation/coordination utility for on-line events; 3) a medium for text-based telecommunication projects” [20]. Arguably the first online art discussion network, ARTEX ran until 1991, involving over 35 globally dispersed artists and supporting pioneering networked artworks, including Adrian’s own The World in 24 Hours (1982) and Roy Ascott’s La Plissure Du Text (1984), “a world-wide, distributed narrative—a collective global fairy tale” [21].

ACEN

ARTEX was swiftly followed by the Art Com Electronic Network (ACEN), an electronic platform for sharing information on art conceived in 1984 by artists Carl Loeffler and Fred Truck (Fig. 1). Early team member and archivist Darlene Tong explains ACEN:

The Art Com Electronic Network ACEN is an interactive personal computer networking system developed by Art Com/La Mamelle, Inc. in San Francisco, California. Officially launched in April 1986, ACEN is designed as a user-friendly information retrieval system dedicated to the dissemination of contemporary art information. The target audience is artists, educators, students, art writers, computer users, and designers, who are interested in keeping current with activities and trends in contemporary art and technology [22].

Loeffler had established La Mamelle in 1975 as a hybrid
Frost, Tong and Loeffler put it:

"nourish" dematerialized art forms. As and platforms for creativity as a way to
La Mamelle’s various strands of activity
performance and video art and envisioned
working with emerging art forms such as
facilitating collaboration among artists
storage and offices—on 12th Street in San
physical arts center—featuring an exhibi-
and exhibitions. The organization put out its own publi-
which supported art publishing events including a 1977 con-
and art publishers from all over the Western world for discussions, presenta-
and activities became more collaborative and interdisciplin ary, fuelling a cross-fertilization of ideas, tech-
forms [23].

As an arts space, La Mamelle was known for staging live
art. Practitioners were often given free run of the building
and could use whichever parts of it were most conducive to
the work they wanted to produce. For example, Tong and
Loeffler recall a work presented in 1976 called Vicarious En-
counters, in which artist Willoughby Sharp, concealed above
an entrance, would watch people arriving and then broadcast
a welcoming video to them while they were in the freight
elevator ascending to the gallery space [24]. Other parts
of the building were used to mount static documentation
of these sorts of dynamic actions, and, headed up by artist
Nancy Frank, La Mamelle amassed an important archive of
video art.

Then there were La Mamelle’s publishing activities. Loeff-
lander had earlier founded the Associated Art Publishers group,
which supported art publishing events including a 1977 con-
vention that gathered hundreds of artists and art publishers
from all over the Western world for discussions, presenta-
tions and exhibitions. The organization put out its own publi-
Figure 1. The Art Com Electronic Network start menu, 1986. (Image: Fred Truck © ACEN/La Mamelle.)

Loffl er and Art Com (the name was eventually adopted
by the organization and its art space as well) were a prolific
experimental publishing unit, and as new communication
platforms emerged, online publishing seemed the logical
next step.

ACEN was accessed via the WELL (Whole Earth 'Lectronic
Link), one of the most important early online community
platforms. The WELL was run on a bulletin board system
(BBS)—a type of communication platform that was the re-
sult of a deep, dark and very snowy Midwestern winter in
1978, when two computer enthusiasts, Ward Christensen and
Randy Suess (both members of CACHE, the Chicago Area
Computer Hobbyists’ Exchange), compelled by the need to
share files without having to travel through the snow, cre-
ated the equivalent of a dial-up cork notice board. Online
community writer Howard Rheingold explains the system
they created:

A BBS is a personal computer, not necessarily an expensive
one, running inexpensive BBS software, plugged into an
ordinary telephone line via a small electronic device called
a modem. . . . Attach a modem to your computer, plug the
modem into your telephone, create a name for your BBS,
post the telephone number on a few existing BBSs, and
you’re in the virtual community business. People call your
BBS number and leave private messages or public informa-

It was started by Stewart Brand and Larry Brilliant, both of
whom had solid first-hand experience of alternative com-
munities. Brilliant had lived for many years on the Hog Farm
commune and after this had harnessed computer-mediated
communication technologies to assist him in his medical
work. Brand had co-founded the Whole Earth Catalogue, a
manual and sales catalogue for the DIY, communal, sustain-
able lifestyle. The WELL became a highly successful platform
for connecting alternative communities and special-interest
groups. Founding staff knew how to engage participants by
offering free accounts to interesting speakers, but it was not
until the Grateful Dead community (known as “deadheads”)
congregated on the WELL that its popularity really exploded. This was because a subgroup of deadheads would spend their time following the band from gig to gig, leading a nomadic lifestyle that such an efficient communication network could keenly support. Tong explains in her 1987 article that BBS and later email were perceived as time- and cost-efficient means of sharing information across a “geographically dispersed audience” and that “the concept of Interactive communication enhances artists’ abilities to keep in touch and have a voice in current art issues” [27]—clearly echoing Avalanche et al. A true collaboration—conceived by Loeffler, developed by programmer Frank Truck and populated by editor Anna Couey, with hundreds of artists with access to the WELL [28]—ACEN continued to develop fertile ground for art discussion online.

fAf, LEA, MATRIX

Fine Art Forum, more generally known as fAf, was an Internet-distributed art bulletin and network set up by artist Ray Lauzzana in 1987 (Fig. 2). Within his own work, Lauzzana had begun to experiment with the concept of communication networks, and as a professor at Amherst College he set about establishing a computer graphics department and expanding the college’s tech resources. He then went on to produce mail art in a project with students on a 3D design course, proposing that students invite artists from around the world to share and exchange artworks with them. This interest in building creative networks led him and his students to establish a newsletter/discussion forum using UNIX (an operating system developed by Bell Labs and made available to universities in the 1980s) [29]. Meanwhile the scientist-turned-artist Frank Malina had established a rigorous academic journal for the discussion of art/science projects in 1968 and called it Leonardo. Leonardo would considerably expand its program when Malina’s son, Roger F. Malina, took over as board chairman and formed the International Society for the Arts, Sciences and Technology (ISAST) in 1982. Artist Judy Malloy, a producer of pioneering works of electronic literature, joined the team in 1991 to curate a strand for the journal called Words on Works, which comprised artists’ statements about their digital and new media art; she then began writing the Leonardo Electronic News (LEN) bulletin. When Roger Malina met Lauzzana, seeing possible connections with his organization’s online offerings, he pledged support for fAf, and Malloy became coordinating editor.

For nearly five years resources were shared and larger audiences were reached, until in 1993 Leonardo/ISAST joined forces with the MIT Press not only to publish books but to create the Leonardo Electronic Almanac (LEA), a reincarnation of LEN, which, under the editorship of Craig Harris, would build a network of projects utilizing emerging media to explore the intersections of science, technology and the arts [30]. Although LEA originally shared much of its content in an emailed bulletin—like fAf did—it eventually built an extensive web resource. Similarly LEA was seen more as a journal, with a quicker turnaround conducive to exploring new online and interactive technologies for demonstrating and contextualizing art. fAf kept to its news and announcements–driven model under the new management of artist Paul Brown, who moved it to a Gopher format (an early web system that allowed for easy distribution of documents via set menus) and then HTML/the Web. From 1996 fAf was produced by art, design, media and journalism students at the Queensland University of Technology, who could take an interdisciplinary elective for degree credit. Over the years fAf supported an online gallery of artworks and archived conferences, including ISEA (International Symposium on Electronic Art). All the projects continued to expand and require more staff, with fAf being handed over to Editor-in-Chief Nisar Keshvani in 1998 and Editor Linda Carolli in 2001. The platform ceased to operate in 2004, when Australia Council for the Arts funding was withdrawn.
Also in 1987, Matrix, a Canadian platform for networking, news and discussion, was established. It was set up by artist-run Toronto art space Inter/Access (originally Videotex), which, in addition to having an exhibition space and publishing program, provided access and training for artists in electronic and computer-based communications. To begin with, Inter/Access provided a discussion platform based on the interactive-television model of Telidon, which was a kind of precursor to the Web. In fact, Telidon most closely resembled the U.K.'s Teletext format of television-based data-sharing, which originated a few years earlier. Eventually, equipment costs forced Telidon out of the market, and Matrix was regenerated as a BBS. Like La Mamelle, Inter/Access focused on a great deal of time-based and electronic art and, for example, are known for showing work by artists such as Vera Frenkel and Norman White, so their Matrix platform seemed the logical next step.

**ARTS WIRE**

Conceived by artist Anne Focke, *Arts Wire* was brought to fruition with the help of Ted Berger and the New York Foundation for the Arts in 1992. Again, this was a computer network dedicated to artistic activity—helping artists access "news, information, and dialogue on the social, economic, philosophical, intellectual, and political conditions affecting the arts and artists" [31]. Judy Malloy, active on ACEN, the editor of *Leonardo Electronic News* (soon to be the *Leonardo Electronic Almanac*) and, joined the *Arts Wire* facilitators (including Art Com/ACEN's Anna Couey) in 1993. In this time before web browsers and other standardizing tools, users needed to connect to modems and execute command-line text to access different parts of a website. It was complicated and time-consuming, and computers/modems were slow, so one of Malloy's initial tasks was to help artists with the laborious task of getting online. She edited the *Current* news bulletins put out by *Arts Wire* in website and emailed form.

In addition to sharing news, hosting artists' websites and collaborative art projects, *Arts Wire* was also known for holding online art "conferences." In fact, "until 2001, *Arts Wire* hosted over 80 arts discussion conferences and over 100 websites for artists and arts organizations, and [their] Map included links to over 400 artists and arts organization members" [32]. These themed discussion spaces ranged from "ARTISTS," which was a general and ongoing discussion, to "PROJECTARTNET," which was described as a "San Diego–based community arts networking project that brought children from schools in immigrant neighborhoods online to create a community history" [33]. A popular forum within *Arts Wire* was the Interactive Art conference set up by Couey and Malloy in 1993. Discussion was organized around a "virtual residency" program in which artists would be invited to use the conference to discuss their work [34]. There were also many cross-platform projects. For example, in November 1992 Malloy and Eric S. Theise started a discussion, "Cultures in Cyberspace," across the following platforms: American Indian Telecommunication/Dakota BBS (U.S.A.), ArtsNet (Australia), *Arts Wire* (U.S.A.), USENET (international) and the WELL (U.S.A.). Likewise people themselves worked across different platforms. The ever-present Malloy was the founder and co-host of the Arts conference on the WELL from 1993 on, and F.A.S.T (Fine Art Science and Technology), a WELL-based forum, on behalf of fAf. She was so integral to the foundations of electronic and online writing and creativity that entire books could be dedicated to her work alone—which is why Duke University has acquired Malloy's personal archives [35].

**CONCLUSION**

These projects show that well before Jerry Saltz had a Facebook page, emerging communication technologies were being used by communities who wanted to explore what art could be online. As previously stated, it has not been my intention here to analyze the style of art critical materials produced online in the 1980s but rather to begin to document the existence of these early online art critical platforms. What they have in common is that they primarily extended efforts first born in the 1960s to experiment with new modes of art production and dissemination. They often supported collaborative projects and developed a variety of art writing that was not restricted to traditional art criticism but spanned news, discussion, interviews, fiction and hybrids thereof. They were also largely the products of the West's disproportionate access to the Internet. Although by the mid-1990s, thanks to the invention of email-based discussion lists (or listservs), online art criticism experienced an explosion of platforms and participants that partially redressed this balance. The second wave of online art criticism developed from a variety of remits and locations from the controversial *Thing* [36] (1991) to the net culture critical *Nettime* [37] (1995); the net art seedbed *Rhizome* [38] (1996); the political Eastern European *Syndicate* [39] (1996); the experimental *7–11* [40] (1998); the curatorial *New Media Curating* [41] (2000); the feminist *Undercurrents* [42] (2002); and the creative *Netbehaviour* [43] (2003).

Regardless of their various origins, these founding online art critical platforms are an essential part of the history of art criticism, and yet their stories and archives are in jeopardy. All art criticism tends toward an ephemeral form that is difficult to research, and this is only intensified online. Many archives of online art criticism are no longer publicly available (even organizations like *Rhizome* are missing parts of their collection), while the histories of such platforms are largely oral and seldom accounted for. Such research issues are not just confined to older platforms. Facebook is not indexed in any useful way and introduces valuable nontextual elements (such as the "like" button) that require specific treatment. A result of this is the development of *Rhizome*’s Webrecorder tool, which aims to help online art discussion communities more comprehensively archive their discussion data [44]. The task that faces us now is to archive and preserve as much as possible of the 30-year history of online art criticism and prepare the way for thorough evaluations of the changing form of art criticism after the Internet.
References and Notes


8 See Steven Cottingham, “No one cares about art criticism: Advocating for an embodiment of the avant garde as an alternative to capitalism,” Temporary Art Review (23 March 2015): wwwTEMPARTreview.com/no-one-cares-about-art-criticism-advocating-for-an-embodi-


14 In my recently published Art Criticism Online: A History (Cantebury, U.K.: Gylphi, 2019), I provide a history of all three waves of online art criticism. Expanding substantially on the introduction to the first wave I have presented here, I also detail the 1990s listserv era and post-2000 blogging—through to social media platforms like Facebook and Twitter—as well as analyzing the types of criticism to which they give rise.

15 Hayles [12].


19 “Robert Adrian X «ARTEX»,” entry on Media Art Net: www.medi enkunstnetz.de/works/artex/.

20 Text from Robert Adrian X's website: www.aliend.mur.at/rax/BIO /telecom.html.


32 Malloy [31].

33 Malloy [31].

The STEAM movement, focused on integrating arts (broadly encompassing visual and performing arts, crafts and design) into science, technology, engineering and mathematics (STEM) education is well underway. We are avid advocates of this movement but worry that integration of arts and sciences into curricula from K–12 through graduate and professional education is not supported by sufficiently rigorous pedagogical studies. If STEAM is to succeed, it must be underpinned by pedagogical principles, methods and materials of high quality and reliability. Toward that end, the Editors of Leonardo have decided to create a STEAM Initiative on Education that will devote a section of the journal to innovative, inspiring and important studies of STEAM pedagogies.

In the spirit of interdisciplinarity, we explicitly welcome diverse methodologies such as mixed methods designs and novel assessment methods designed to meet the special needs of STEAM educators. We particularly welcome studies employing well-designed, randomized classroom controls and utilizing well-validated learning measurement standards, but Leonardo recognizes that one of the challenges of STEAM integration is that it may require new approaches to teaching and learning. We therefore welcome articles that are focused on the development and testing of novel approaches and methods for purveying and evaluating integrated learning.

MANUSCRIPT SUBMISSIONS

We are seeking manuscripts up to 2,500 words. See leonardo.info/authors-journals for detailed instructions.

To submit a paper, upload the manuscript and art at <editorialexpress.com/Leonardo>.