The Journal of the International Digital Media and Arts Association

Tab

Submission Guidelines

Articles on digital media and art related topics are welcome at any time. An abstract of not more than one page should be submitted to the editor via e-mail (mniederman@colum.edu). Please include "iDMAa Journal Submission" in the subject line.

Upon review, authors will be advised of acceptance for submission. The Journal will include a section for invited and refereed articles. While length will vary from issue to issue due to themes, articles will generally be 1500 to 4000 words. Any author preferring a peer review will automatically have the submission considered for the refereed section of the Journal.

While the Journal will normally appear in electronic form (PDF), at least one print version will be published annually.

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"Beyond

Jeff Ritchie

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Boundaries...”

Jeff Ritchie
Lebanon Valley College

I serve as assistant editor of the *Journal of the International Digital Media and Arts Association*. My charge is to solicit, select, and publish the proceedings of the annual conference, the most recent of which was held in Philadelphia, PA and had as its topic, “Beyond Boundaries: Pedagogy and Change in the Academic Environment.”

This topic brings to mind a question often asked of me and just as aptly asked of iDMAa. New acquaintances and colleagues will often ask in the course of conversation, in what program do I teach. When I tell them, the question is nearly always the same. What is Digital Communications? Having continually to define and explain what you do is both trying and liberating. It is trying in that the understanding, respect, and certainty of an existing field is lost to me. It is liberating in that I can choose to define this program as I see fit (within the constraints of my institution) and in turn help to define the larger field in which it is situated (within the constraints of the world at large). After all, it is far more desirable to tell your own story than to have someone tell it for you.

Yet what is the field in which iDMAa operates? The liberation allowed by any of our acts of self-definition is still constrained by a culture that operates within disciplines, fields, and departments. Boundaries define our world – going all the way back to the Aristotelian urge to categorize the natural world. In what “bucket” or “buckets” do we place digital media and arts? What, if anything, defines the field?

The conference’s theme seems to assume that we are in fact beyond boundaries. I suppose that it remains to be seen whether we are. If not, what boundaries define “it,” and if so, can whatever “this” is exist beyond or without them? What form will Digital Media and Arts take?

Given the ubiquitous nature of digital media – and its influence on the different disciplines – we would be safe in arguing that a paradigm shift has occurred that has dramatically altered the landscape of possibilities afforded to academics and professionals. We might safely believe that the “something truly transformative” that has taken place has moved our niche in this world beyond the boundaries defined by previous disciplines.

We might also believe that eventually Digital Media and Arts, this singular field or plural fields, will dissolve back into a field of disciplines similar to the preexisting disciplinary landscape. How did the printing press or mass media – truly paradigm shifting technologies – change contemporary disciplines and fields? How did writing? When will the E-commerce class or the and E-Journalism class drop the prefixes and again be labeled just Commerce and Journalism? It seems as though their distinction is based on the newness and dislocation caused by digital media. Like other paradigm shifts, the dislocation caused by technology could eventually resolve itself. The novelty of the means of the commerce – the medium – loses its emphasis in favor what is done via this medium. Just as well, journalism may supersede its digital concerns.

Or yet again, we can believe that digital media and arts as a field can exist across disciplines. It might not be an easy existence given the world’s obsession with boundaries, but it is an existence none-the-less. Other fields have done so. Why can’t we do the same?

The papers in this conference edition trace out the changes wrought in the academic, professional and cultural landscape. Some speculate how to best deal with these changes. These papers show how digital media has altered the bounding topography of this world in the lines and contours of professions, artistic practices, pedagogy, art, and novel means of instruction. I hope that you find them instructive and enjoyable.

In the next volume of the *Journal of the Digital Media and Arts Association*, we will invite you to help take part in a grand act of self-definition and to question whether digital media and arts is in fact beyond boundaries. I’d encourage you to take part.

Keywords:
on-line journalism, digital journalism, newspaper survival, senders and receivers, journalism culture, citizen journalism

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Crossing a virtual boundary: Trends and issues confronting print journalism in the digital era

John Beatty
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The relationship between print and online journalism appears to have reached a crisis point within the last year. The Associated Press and others have issued position statements on the future of journalism in a digital world. University curricula are moving to conceptualize digital journalism. This raises a series of questions: What is journalism? What is its culture? What does it have to offer to redefine itself as primarily (or solely) a digital channel? Who will be the gatekeepers (or gatewatchers)? What economic models will prevail? Are online and print channels synergistic? The paper concludes with some predictions about the most promising forms of online journalism content.

The case that the digital age has ushered in a fundamental shift in social structures and communication, indeed much of human experience, has by now been well made.[1] A key component of that shift is also clear – the ability for the Internet to allow the public to act both as senders and receivers, to use the old Shannon-Weaver communication model terminology, with feedback loops that are thereby brought to another order of complexity. If the sender-receiver dichotomy no longer applies as it once might have, then senders – media entities such as printed newspapers for one – are destined to have to rethink their structures and experiences in a radical way.

It seems clear that this rethinking has recently shifted into high gear. Anecdotal evidence is presented below that points to what I called a watershed. As this was being written, Tom Curley, president and CEO of the Associated Press, delivered a speech in which he said that the news industry has come to a fork in the road.[2] Curley had a sense of urgency. He claimed that the news industry has to accept that readers want control over what they get, that too much energy has been wasted trying to extend the old models, that advertising is changing from mass to targeted, that content models need to change ("Think of it as a mix from news radio to The New Yorker all under one roof with the New York Public Library thrown in"), and that distribution needs to support linking and viral sharing of content.

The Committee of Concerned Journalists was formed by Bill Kovach and Tom Rosenstiel in large part to study and promote means by which the institution of journalism can continue on in the face of challenges brought on by the fundamental shifts of the digital age. An October, 2007 Hurley Symposium at the partnering Missouri School of Journalism asked: "Can Journalistic Principles Survive and Thrive in A Digital Environment?"[3] Chief among those principles, derived from earlier writings of Kovach and Rosenstiel,[4] were verification, creating a forum for public "compromise and criticism," and making important news interesting, something that speaks directly to the role of digital media artists.[5] These suggest by implication that traditional journalism is concerned that the digital flavors are weak in verification, that they tend to bury or trivialize what should be seen as important, and perhaps that the forum it does provide runs the risk of being taken over by the shrill and poorly informed because traditional journalism institutions no longer fully control the process of entry into the profession.

The discussion is, of course, ongoing among all forms and aspects of the journalistic endeavor. The same sense of threshold is evident in MediaBistro's panel discussion, "The future of photojournalism in a digital world,"[6] held in August of 2007, a panel that noted a blurring of the still vs. video distinction, the idea that essentially all photojournalists are now digital people, and the fact that almost anyone can produce video for the Web, which in turn raises issues about the truth and believability of digital photojournalism content.

Clearly this has been building for a while. It's been three years since Philip Meyer published *The Vanishing Newspaper: Saving Journalism in the Information Age*.[7] Meyer makes a strong empirical case for the "influence model," which suggests that newspapers (and by extension, other traditional forms of journalism) can survive, indeed prosper, if they leverage their influence or standing in the community to enhance their commercial influence. Indeed there is already a sort of reified sense of what Mersey calls "a virtuous cycle linking newspaper readership to a sense of community for the benefit of social capital," although her research suggest that this link is weaker for the on line product.[8]

Has a watershed really been reached?

This paper attempts to provide a summary of current issues related to the tension between print and on line

1 Jeff Rutenbeck, "Bit by Bit: Hypercomplexity, Digital Media Studies and Higher Education." *Journal of the International Digital Media and Arts Association* 3(1): 19–29.

2 Tom Curley. "What's New" (November 5, 2007), http://www.ap.org/pages/about/whatsnew/wn_110107a.html. (November 5, 2007).

3 http://www.concernedjournalists.org/can-journalistic-principles-survive-and-thrive-digital-environment

4 Bill Kovach and Tom Rosenstiel. *The Elements of Journalism. What Newspeople Should Know and the Public Should Expect*. (New York: Three Rivers Press, 2001).

5 See J. Michael Moshell. "The Core Principles of Digital Media. *Journal of the International Digital Media Association* 4 no. 2 (2007): 71–79.

6 http://www.mediabistro.com/photojournalism-31-ondemand-video.html?c=jpencrs

7 Philip Meyer, *The Vanishing Newspaper. Saving Journalism in the Information Age* (Columbia: U. of Missouri Press, 2004).

8 Rachel Mersey, "Maybe the Internet Can Not Save Journalism: The Geographic Sense of Community Gap" (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., August 8–12, 2007).

journalism. It argues that there seems to be a watershed on the horizon in the move from print to Web. In the past 12 months or so, job postings on key journalism and editing listservs (e.g. JOURNET, J-JOBS) and Yahoo! groups (e.g. ACESjobs) to which I subscribe have asked print applicants to have Web and multimedia skills as well. On the academic side, several schools such as Old Dominion University are advertising for positions such as Assistant Professor of Digital Journalism, requiring a similar set of skills and abilities. Beyond the notion of "convergence," which traditionally has referred to merging print and TV operations, the academy is in the process of radically rethinking traditional boundaries in researching and teaching from among disciplines such as communication, journalism, broadcasting, film, digital arts and design, database management and programming/scripting – indeed, a list that reflects concerns of conferences such as this one and associations such as iDMAa.

Rather than asking what are the problems that confront journalism, Neil Postman suggests that a better question is: What are the problems to which journalism is the solution?[9] He suggests that while early journalism arose to solve problems of information scarcity, the "problem" for journalism now is more clearly one of information overload. If that is, indeed, the case and represents some sort of new paradigm for information presentation, then there is a significant set of new questions that must be answered in order to make some sense of the trajectory involved. This paper lays out some of these for consideration, loosely organized from the broad to the specific.

At the broadest level, this new paradigm, if indeed it is such, re-raises questions about the very nature and notion of "journalism" and "journalists." Journalist Judy Woodruff, for one, asked "Are Journalists Obsolete?" in her 2007 Red Smith Lecture in Journalism at Notre Dame University.[10] Not surprisingly, she believes that they are not. She sees blogging as largely uncontrolled, and lauds large-scale efforts such as the Washington Post's expose of the Walter Reed Army Medical Center. The press, Woodruff argues, is still positioned to provide a "vital public service"[11] and to satisfy a growing demand for "good content."[12]

In the face of a blogosphere arguably in need of a set of standards, Philip Meyer, among others, suggests ways in which journalism needs to reinvestigate and strengthen its stance on professional and ethical standards. However, Meyer cautions that

> The chief threat to newspapers in the twenty-first century will come from entrepreneurs who figure out how to use the more favorable cost structure of Internet-based media to provide better services to the same kinds of communities that newspapers have served so well.[13]

That sort of efficient service provision is becoming evident, for one, in classified and personalized advertising, long a key revenue source for print. Woodruff concedes that in response to such entrepreneurs, the business model for print/on line hybrid operations is still elusive.[14] It remains to be seen whether these entrepreneurs can find a way to provide and develop community structure and influence in the way that Meyer and Auman[15] feel has traditionally been a strength of print journalism. Cost – and profit – trimming are still likely to be required of traditional print outlets in the face of the new "rough beasts," as Meyer calls them.[16]

What "is" journalism, or the culture of journalism?

Auman's case study of the *Honolulu Star-Bulletin's* resurrection provides evidence for the importance of influence, in the community sense. Auman's ethnographic study of the paper revealed two themes: resistance to external pressure on, or control of the paper, and a strong identity as the "local" paper.[17] Mersey also found a connection between newspaper readership and a sense of community, but with a suggestion that this has not yet transferred fully to on line readership.[18]

9 Katherine Fulton, "A Tour of Our Uncertain Future," in *Readings in Mass Communication. Media Literacy and Culture*, ed. Kimberley B. Massey (Mountain View, CA: Mayfield, 1999).
10 Judy Woodruff, "Are Journalists Obsolete?" *Red Smith Lecture in Journalism* (Kansas City: Universal Press Syndicate).
11 Ibid., 9.
12 Ibid., 10.
13 Philip Meyer, *The Vanishing Newspaper. Saving Journalism in the Information Age* (Columbia: U. of Missouri Press, 2004), 227.
14 Judy Woodruff, "Are Journalists Obsolete?" *Red Smith Lecture in Journalism* (Kansas City: Universal Press Syndicate).
15 Ann Auman, "Survival in Paradise: How 'Local Identity' Helped Save the Honolulu Star-Bulletin." *Journalism and Mass Communication Quarterly* 84 (2007): 373–391.
16 Philip Meyer, *The Vanishing Newspaper. Saving Journalism in the Information Age* (Columbia: U. of Missouri Press, 2004), 227.
17 Ann Auman, "Survival in Paradise: How 'Local Identity' Helped Save the Honolulu Star-Bulletin." *Journalism and Mass Communication Quarterly* 84 (2007): 373–391.
18 Rachel Mersey, "Maybe the Internet Can Not Save Journalism: The Geographic Sense of Community Gap" (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., August 8–12, 2007).

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Attempts such as these at identifying essential dimensions of journalism as a practice and institution bring into play the larger issue of whether a professional "journalism culture" can be "operationalized" in any agreed-upon way. This is precisely the task that Hanitzsch sets himself.[19] Hanitzsch locates seven identifiable dimensions of journalism culture that he says have persistence and global relevance: Interventionism, Power Distance, Market Orientation, Objectivism, Empiricism, Relativism, and Idealism. He concedes that his constructs were not intended to include citizen journalism, although he is able to locate public/civic journalism along these seven dimensions. Nevertheless, Hanitszch's scheme suggests that "journalism" has (or is) a culture with identifiable institutional roles, epistemologies, and ethical orientations. Together these suggest that journalists have a group identity and that there is a "collective conscience for the profession."[20]

Demonstrating and defining that collective conscience is, in effect, what the Committee of Concerned Journalists (CCJ) sees as its guiding force. The committee carried out years of research and public forums to arrive at a list of nine Principles of Journalism, three of which (verification, a forum for compromise and criticism, and making important news interesting) were mentioned above as the focus of the 2007 Hurley Symposium at the Missouri School of Journalism. The others are: an obligation to the truth, loyalty to citizens, maintaining an independence from those being covered, serving as an independent monitor of power, keeping news comprehensive and proportional, and allowing practitioners to exercise their conscience.[21] Other groups such as journalism.org have adopted CCJ's principles, so it is arguable that these principles are the ones around which definitional issues (i.e., "what is journalism in the digital era?") revolve for the near future as the relationship between print and Web evolves.

19 Thomas Hanitzsch, "Deconstructing Journalism Culture: Toward a Universal Theory," *Communication Theory* 17 (2007): 367–385.

20 R. Keeble, "Journalism ethics: Towards an Orwellian critique?" in Journalism: Critical issues, ed. S. Allan (Maidenhead, UK: Open University Press) quoted in Thomas Hanitzsch, "Deconstructing Journalism Culture: Toward a Universal Theory," *Communication Theory* 17 (2007), 380.

21 Ibid.

What are the possible trajectories for traditional and new ("citizen") journalism?

Indeed, Woodruff's stance, and Hanitzsch's constructs are among many indicators that journalism itself perhaps is not changing all that much. Beam, following McChesney and others, asks whether on line news will continue the status quo as mainstream media's influence just shifts forms, given its substantial base of resources, credibility, and audiences. But he also asks whether there are significant new directions in the process of gatekeeping, something that bloggers might already claim is well underway.[22]

Gatekeeping, in the sense of deciding what's worthwhile based on a grounded and articulated set of filters, has been a thread in journalism research since Kurt Lewin's formulation was applied by David Manning White in a "classic" 1950 study on the process one wire editor used in deciding what to print and how to prioritize content.[23] If it is agreed that an information glut is upon us (although that claim too often goes unchallenged), then journalism still should be poised to provide the service that sorts through and selects from the glut, no matter the format in which content is ultimately delivered. However, there is no doubt that to some significant degree, "Internet technologies are shifting gatekeeping and [what Axel Bruns calls] gatewatching powers directly to users."[24]

The question here is whether traditional journalism has enough critical mass, in the form both of economic power and cultural influence, to control the new channels, and whether bottom-up citizen journalism will be able to develop its own economic and cultural influence to survive as an alternative form. Quite likely, both will endure, as well as hybrid forms such as the Washington Post-led LoudounExtra.com,[25] which Webb sees as the current model of what can be done by "non-mainstream media hyperlocal sites."[26] The "rub" for Webb is that just these sorts of sites are being produced by non-mainstream citizen groups in increasing numbers and quality. She cites iBrattleboro, Chi-Town Daily News and Philly Future as ones to watch;[27]

Meyer's influence model assumes a sort of "Habermasian public sphere"[28] in which the institution of journalism resides. One concern about the potential viability of the blogosphere and other alternative citizen channels is that by tending toward fragmentation of the audience, they essentially remove themselves from that public sphere, or at least confine themselves to a sphere that has little or no impact on democratic processes. The same could be expected of mainstream journalism outlets on the Web if they attempt to capture the same sorts of niche audiences. Tewksbury combined Nielsen/NetRatings data and content analysis to show both that on line news users tend toward specialization in what they seek, and that outlets are tending to match that in what they provide.[29] Much of this seems driven by what the users seek, rather than selectivity or prominence afforded by the on line sites (for example, half of all viewers on the *Chicago Sun-Times* site went there to read Roger Ebert's movie reviews), but there is every reason to expect on line journalism to recognize and encourage that audience specialization.

What are some of the specific issues, technologies, and strategies driving recent practices in the move to on line journalism?

If indeed there has been a sea change in journalism, the larger conceptual and strategic issues should begin to sort themselves out over the next few years. For the moment, then, it makes sense to micro-examine the print versus on line boundary, which itself is blurring. How will the nature of the technology influence the direction? Obvious questions center on the role of interactive content, of digital archives, of immediate/breaking versus more analytic or reflect content, of synergies between on line and paper (and broadcast) arms of the same media company, and where the money is, of design and usability on line, and what kind of pedagogy and research can make sense of, and best mold

22 Michael Beam, "Gatekeeping: From Inception to the Internet" (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., Aug. 8–12, 2007).
23 David Manning White, "The 'Gate Keeper.' A Case Study in the Selection of News," *Journalism Quarterly 59* (1950): 60–65.
24 Michael Beam, "Gatekeeping: From Inception to the Internet" (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., Aug. 8–12, 2007), 13.
25 The Washington Post Company. "Loudon Extra." *Washington Post* http://loudounextra.washingtonpost.com/ (accessed Nov. 7, 2007).
26 Amy Webb, "Little (Big) Threats" ... *myDigiMedia*. http://mydigimedia.com/2007/11/01/little_big_threats.html (accessed Nov. 11, 2007).
27 Ibid.
28 Jurgen Habermas argues that communication in the public sphere, as distinct from private or public authority, is essential to the functioning of democracy.
29 David Tewksbury, "The Seeds of Audience Fragmentation: Specialization in the Use of Online News Site," *Journal of Broadcasting and Electronic Media* 49 (2005): 332–348.

the new mix of on line and print. The emphasis here is on the arc of traditional newspaper companies, but the distinct path for magazines is worth noting as a side issue, for now.

In addition to the indicators mentioned, there is hard economic data showing that print newspapers are in trouble, and that short-term cost-cutting cannot continue to keep them profitable.[30] The on line versions are also in some trouble because other entrepreneurs invested in capturing advertising in the early days of the Internet, while papers were slow to do so.

While Morton indicates that both print and on line newspaper industries are trending negatively, the Bivings Group put the issue another way in its report: "American Newspapers and the Internet: Threat or Opportunity?,"[31] which asserts that "the Internet presents newspapers with a unique opportunity to make up for lost circulation and readership.", as Teeling summarizes it.[32] Much of that opportunity is seen in the use of video, RSS feeds, reporter blogs, and reader comments added to articles.

Similarly, Tremayne, Weiss, and Alves found a sharp rise in multimedia and interactive content in on line papers, particularly video, and particularly in coverage of weather, sports, crime and accidents.[33] It is logical to assume that the public will continue to turn to on line news outlets for breaking news, leaving the print versions perhaps to develop more in-depth analytic pieces. Mensing and Greer found that on line papers tended to lead with crime or accident (or international) stories at the same time as print versions were leading with governmental and election news.[34]

There is other support for the position that on line outlets provide an opportunity to increase the role of the media in society, to allow for better and more engaged storytelling,[35] and a consequent stabilization of the corporate engines that will continue to run the important outlets for the foreseeable future. American Public Radio, for one, has launched a successful on line tag-based forum called the Idea Generator: Preserving the American Dream.[36]

Such a primarily on line future might mean that more print papers will be given away for free, and often not delivered to homes. For the moment, there is evidence of synergies between print and on line outlets of the same company. There is evidence of a growing on line newspaper readership overall at about a 15 percent increase from 2005 to 2006,[37] and of crossover readers who use both print and Web.[38] "Reverse publishing" from on line to print is being pioneered by organizations such as Village Soup[39] in Maine. One survey of young adults' expectations actually predicted more would seek their news from traditional media sources including newspapers, as opposed to social-networking sites in five years.[40] However, other data predict strong declines in print readership, especially for magazines – trend data need to be better aggregated. Magazines were generally found by the Bivings Group to be slower to adapt to Web 2.0 sorts of interactive technologies.[41] Similarly *The Economist* held that the American and European magazine industries have been slow to get onto the Internet.[42]

30 John Morton, "Buffeted," *American Journalism Review online.* (2007, October/November) http://www.ajr.org/ (accessed Oct. 11, 2007).

31 Bivings Group, The,"American Newspapers and the Internet: Threat or Opportunity?" *The Bivings Report*. http://www.bivingsreport.com/wp-content/uploads/2007/08/newspaper-study_22.pdf (accessed Aug. 17, 2007).

32 Erin Teeling, "American Newspapers and the Internet: Threat or Opportunity?" *The Bivings Report*. http://www.bivingsreport.com, posted July 19, 2007, (accessed Aug. 17, 2007).

33 Mark Tremayne, Amy S. Weis, and Rosental Alves, "From Product to Service: Dynamic Content in Online Newspapers." (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., August 8–12, 2007).

34 Donica Mensing, and Jennifer Greer, "Above the fold: A Comparison of the Lead Stories in Print and Online Newspapers," in *Internet Newspapers. The Making of a Mainstream Medium*. ed. Xigen Li (Mahwah, N.J.: Lawrence Erlbaum, 2005).

35 Mark Bowden, "Journalism's future is in global dialogue," *philly.com*. (June 17, 2007) http://www.philly.com, (October 10, 2007).

36 "Preserving the American Dream," *Marketplace,* American Public Media, http://marketplace.publicradio.org/american-dream/ (accessed Nov. 6, 2007).

37 Jack Loechner, "15% Increase in Visits to Newspaper Websites," *Research Brief* (April 13, 2007) http://publications.mediapost.com (April 16, 2007).

38 H. Iris Chyi, and Nick Lasorsa, "The Market Relation Between Online and Print Newspapers: The Case of Austin, Texas," in Li, *Internet Newspapers: The Making of a Mainstream Medium*. ed. Xigen Li, (Mahwah, N.J.: Lawrence Erlbaum, 2006); "New Study Finds Significant Crossover in Newspaper Readership and Usage of Newspaper Websites." Newspaper National Network. (June 18, 2007). http://www.nnnlp.com (accessed August 31, 2007).

39 "Village Soup," Village Soup Media Services, http://www.villagesoup.com/ (accessed Nov. 6, 2007)

40 Seth Lewis, "Next-generation news consumers: An exploratory study of young adults and their future with news and newspapers," (paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Washington, D.C., August 8–12, 2007).

41 Bivings Group, The, "American Newspapers and the Internet: Threat or Opportunity? *The Bivings Report.* http://www.bivingsreport.com/wp-content/uploads/2007/08/newspaper-study_22.pdf (accessed Aug. 17, 2007).

42 "Magazine Industry. Out of Vogue," *The Economist*, September 29, 2007, 72–73.

The blogosphere, not surprisingly, is at the center of this issue. Howard Owens argues that "The next three years could be critical for the on line news game."[43] His questions concerning this period center on whether on line newspapers will be able to arrive upon a suitable set of sources of advertising revenue. Lucas Grindley calls for a cut in print sections and pages and an increase in on line-only content.[44] Some of the discussion was fomented by the Bivings Report mentioned above. [45] Robin Miller suggests key components for on line newspapers that parallel items in the Bivings Report.[46] Her suggestions include comprehensive calendars, video reports, stringers (as opposed to volunteer or "citizen" journalists), RSS, and premium ads that tie to things such as calendars or events listings. *Valleywag.com*[47] points out that *The New York Times* posted its first video to the editor[48] in September, 2007, although this raises the issue of access to such a channel by those without deep technical and journalistic skills (the 10-minute video was produced by filmmaker Charles Ferguson).

Research to assess means of "improving user experience through design and layout of newspaper websites" is also at the forefront of the issue.[49] Bloggers such as Will Sullivan, at Journerdism.org and The Bivings Group present arguments for the particulars of effective design and navigation of on line papers.[50] Sullivan noticed that newspaper navigation seems to be sorting itself into four distinct arrangements, which he calls vertical, horizontal rollover, basic horizontal and site map,[51] although this places undue emphasis on front pages and sections fronts, and indeed on internal navigation itself, in an era when most of the traffic is driven through search engines to the story, rather than to the paper. The Bivings Group posted their Top 10 newspaper websites,[52] although these were drawn from their larger study of the top 100 in circulation, so the list is rather predictable (top three in order: *The New York Times, Washington Post, USA Today*).

Particulars of on line news headlines[53] and other components of on line text are also likely to receive increased research attention. The future of the inverted pyramid story form is clearly in jeopardy, as Curley noted in his speech, not without remarking upon the irony of the CEO of the Associated Press making such a proclamation (he actually said, "The inverted pyramid is dead."[54]) when AP had invented the form. Canavilhas proposed a "tumbled" pyramid, one essentially turned on its side to show the process of exploration from the initial story contact toward ever-expanding levels of explanation, contextualization and exploration. [55] Non-linear hypertext narratives have long since progressed to the point that software companies such as Eastgate[56] exist to support products such as Tinderbox that produce these non-linear hypertexts. The intersection of this sort of content with on line journalism is yet another avenue of possible exploration.

Some summary comments

This paper attempts to make a case that there has been a watershed in the relationship between print and on line journalism. The next few years may, indeed be crucial. Immediate issues center on what sorts of content, interactive technologies, design, and usability strategies are likely to increase users of on line newspaper outlets. Synergies

43 Howard Owens, "The next three years are critical for newspaper web sites," *howardowens.com*. http://www.howardowens.com (accessed August 31, 2007).
44 Lucas Gindley, "Prepare for salary cuts across the board," *lucasgrindley.com*. http://www.lucasgrindley.com, (accessed September 5, 2007).
45 Bivings Group, The, "American Newspapers and the Internet: Threat or Opportunity?" *The Bivings Report*. http://www.bivingsreport.com/wp-content/uploads/2007/08/newspaper-study_22.pdf (accessed Aug. 17, 2007).
46 Robin Miller, "How newspapers can thrive on the World Wide Web," *Online Journalism Review*.(July 24, 2007), http://www.ojr.org (accessed July 31, 2007).
47 Mary Jane Irwin, "Online video," *valleywag.com*. (September 14, 2007), http://valleywag.com/tech/online-video (accessed September 17, 2007).
48 – Charles Ferguson, "Letter to the editor," *New York Times*, (September 21, 2007) http://video.on.nytimes.com/?fr_story=54a96b0d367da6ce96eb1401f0e127f76688ddd6 (accessed November 7, 2007).
49 Bivings Group, The, "American Newspapers and the Internet: Threat or Opportunity? *The Bivings Report*. http://www.bivingsreport.com/wp-content/uploads/2007/08/newspaper-study_22.pdf (accessed Aug. 17, 2007)
50 Will Sullivan, "Four trends in newspaper website design," *Journerdism* August 19, http://www.journerdism.com, (accessed August 23, 2007); Erin Teeling, "Top 10 Best Newspaper Websites," *The Biivings Report*, http:www.bivingsreport.com (accessed August 18, 2007).
51 Will Sullivan, "Four trends in newspaper website design," *Journerdism* August 19, http://www.journerdism.com, (accessed August 23, 2007);/
52 Erin Teeling, "Top 10 Best Newspaper Websites," *The Bivings Report*, http:www.bivingsreport.com (accessed August 18, 2007).
53 Elinor Mills, "Newspapers search for Web headline magic.," *CNET News.com*. (February 2, 2007) http://www.news.com/Newspapers-search-for-Web-headline-magic/2100-1038_3-6155739.html?tag=item (accessed March 27, 2007).
54 Tom Curley. "What's New" (November 5, 2007), http://www.ap.org/pages/about/whatsnew/wn_110107a.html. (November 5, 2007
55 João Canavilhas, "Web Journalism: From the Inverted Pyramid to the Tumbled Pyramid. *Journal of the International Digital Media and Arts Association 4* no. 2 (2007): 21–29.
56 Eastgate Systems, Inc. http://www.eastgate.com/ (accessed Nov. 1, 2007).

between print and on line versions seem likely to continue and perhaps will take new forms. Models for revenue still need to be sorted out.[57]

Larger issues center on the role and future of traditional journalism itself. If indeed there are strong arguments that journalism has an identifiable culture, and that it attains value in large part from its influence and standing in its geographic communities, then it remains to be seen whether and how that influence and standing can be transferred to the Web in the face of competing citizen initiatives that arose outside of that tradition. There are many who would rather that the citizen competition wins out. But if there is no absolute boundary between the two forms, as is becoming apparent, then there is no reason that some hybrid model is not a possibility, and even perhaps one to be preferred. What that looks like, how it functions and what are its influences need to be central topics of research and analysis.

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keywords

alphabetizing, analogue art, arrangement, color composition, color information, chromatic array, communication, composition, computational art, continuity, data, digital art, digital culture, digital essay, digital experience, digital image, fractal art, fragment, image, language, last supper, medium and message, normative, observation, perception, photographic, process, slave ship, technology

Bill Davis

After receiving a 1993 B.F.A. in Photography from Ohio University Bill Davis put his degree to work in Chicago and Prague. In 1995 he exhibited in The Ljubljana Photo Festival, lectured at the University of Leeds, England, translated American Photo History into Czech for the Umeleckoprumyslove Academy of Usti Nad Labem and received grants or support to work in Korea (Rotary Travel Selection) and exhibit in Australia (Federal Government Arts Funding Body of Australia), England (University of Leeds), and Ukraine (Ohio Arts Council/CKSCP). He is a professor of digital and photographic arts in a full-time appointment at the Western Michigan University Frostic School of Art where he has most recently published his own and his student's work in the UPenn Kelly Writer's House XConnect and Focal Point Press's Light and Lens by Robert Hirsch.

Data as Art Text and Color as Message

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Much digital art, like photography, is virtual. A stand-in for reality, it leads many to confuse art with a picture of art. This is a tolerated form of deceit. We linguistically drop the difference between actual and virtual in pedestrian conversation. The virtual person, place, or thing acceptably replaces the actual person, place, or thing. This is the cornerstone of virtuality – the same but different. This has significantly directed the results of my recent creative work, titled, "The Data Series." It meditates on the issue of "same but different" by re-presenting data. It is most akin to inverting a 2-D photograph. The composition changes, but the content does not. By that measure, content becomes re-registered in ways that make it the same but different. In this series, I am alphabetically or alpha-numerically sorting text and image file meta-data. Color, arranged by value, is like text arranged alphabetically. A text document alphabetically ordered reads very differently. When that text document is placed next side-by-side to similar ones, it becomes a social study. For example, we can use this technique to compare the alphabetized Grammy "Song of the Year" from the past forty years and find basic social patterns. As viewers, we are left to compare cultural message via text and color, which read the same but different- to each generation. The attached paper demonstrates a sample of that.

To see color is to see light. To read literature is to read a message. To make them electronic is to make them fractals of a larger whole. It is this paradigm that needs the attention and imagination of the users who put themselves between the interface of the computer in their head and the computer on their desktop. Electronic (intermittent) transaction is the nature of our digital era. It is also the reason and the resource for the art I make and would like to see made more. I wrote and intend for this essay to be read as an artistic statement and a critical observation. To that end, this essay obligates the artist's statement to the artist's observation. What follows is a meditation on the structure of digital transaction and a position to align and discover shared relationships between the nature of text, image, and sound as discontinuous electronic message.

To make an image digital is to make an image fractal. To make music digital is to fragment sound. To search for text is to key by one or multiple words at a time. I am not critical of fragmented art, but I cannot help but observe an obtuse willingness by the general public to accept it as analogue or continuous. In that context, the art and information in this essay echoes this observation and acts as a corrective or analytical measure for the contradictions we experience as stewards and users of both analogue and digital devices. While these devices contain data, they mediate it in dissimilar ways.

The jpeg file ironically camouflages "photography" as part of its acronym. The MP3 file is an investment in the subdivision of music. The different techniques used to sequence the experience these files deliver modify the nature of what actually *is* experienced. While dots of sounds played side by side are different than the dots that form an image in the visual cortex, they employ fractal strategies to represent some thing, which was once more actual or realistic. The MP3 is to wax what the jpeg is to silver. Both are discontinuous compounds of arrayed bits sequenced to represent seamless experience. Silver like wax has viscosity and consistency. Their organic states make each of them structurally indivisible. Yet, to digitize image or sound is to employ a conversion from photo- or phonographic to datagraphic experience; and it is the process of this conversion that fractures, divides, and multiplies a message. Furthermore, the pixels and the bytes generating the texture of image and sound can be echoed by the arrangement of the written word. In that context, the sound, the pixel, and the word have my attention as finite and sequenced data, which in their normative states can be arranged to generate meaning and communication. It is the non-normative form they take as converted digital arrays that drive my production and commentary on perception of sound, image, and message.

By extracting meaning from communication I hope that viewers can experience the medium before they meet the message. To that end, the concepts I am sharing in this essay portray communication as a byproduct of sound, language, and sight. What we see or hear is different than what we think about what we see or hear. It's the arranged composition of sound and light that give them meaning and it is my attempt to *re*arrange them in a way that gives viewers a greater appreciation of their structure. Therefore structure mediates meaning and my re-arrangement of structure seeks to push meaning off the cliff. Clearly, the need for communication itself has not changed, but the methods of communication have changed; and these methods will lead to reinvented models of their former selves. Land lines have been eclipsed by mobile phones. The telephone wire has been replaced by the cell tower. Personal mail has yielded to e-mail, which means the method of writing communication by hand has been mostly replaced by the method of typing communication by keyboard. E-mail is less mobile than texting. Laptops are being replaced by handheld devices. The mobile phone is in perpetual state of reinvention as it is assaulted with new technologies. It has transformed from a phone into a wireless device by which users communicate with automatic teller machines, household appliances, internet servers, security systems, and each other. Bluetooth enabled phones allow users within a thirty-foot range to "tooth," which means to meet clandestinely. Thus these existing and emerging technologies have so greatly expanded opportunities to experience communication that we now call speaking without them, "face-to-face." The devices listed above have not changed the content of communication, but they have rearranged the methods and priorities under which communication operates. It is the rearrangement of content that continues to attract my attention.

If we alphabetically order the U.S. Constitution, we are not redacting it, but we are re-interpreting it in a way to observe the palette and priority of the language of that document (see Figure 2 After The U.S. Constitution). Leonardo DaVinci's masterpiece, *The Last Supper*, shares a similarity through the histogram of its digital profile. Like the process of alphabetizing, one may extract and redeploy the normative color in a digital file to index and sequence its algorithmic palette via red, green, and blue histograms (see Figure 1 After The Last Supper). In this context, the alphabet and the histogram echo each other as methods of structure, order, and measurement. While analogue arrangement

combines to compose and form meaning, a reproduction of its digital "twin" will identify the structure of that arrangement as channel and data.

Figure 1 *After The Last Supper,* Bill Davis (2005)

The image on the top is an array of color, which has been incrementally removed from the thumbnail images below. In comparison to Davinci's *Last Supper,* it is datagraphically the same, but visually different. The thumbnail images identify the sequential removal and conversion of color as arranged meaning to color as data array.

In this post-information age, data is transacted more than it is understood. How many readers can list the variety of phone numbers and/or e-mails attached to the names of the people with whom they communicate? How many artists remember the variety of colors they mixed or used to complete a painting? It is as if "having more" means "knowing less." As an observer and user of digital devices and culture, I believe that most users of digital commerce view *having* as more important than *knowing*. In the context of studio art, this process is both fascinating and informing. In the context of pedestrian use, the process is simultaneously overwhelming and unpredictable. As a user and a studio artist, I most identify with the nature of our transaction more than the nature of the communication the transaction may produce. Production has exceeded consumption. The *quantity* of any landfill will help one better understand the *quality* of this position. No reader of this journal can surely know the catalog of everything they own and/or have discarded. In digression, virtuality protects us from material waste. "Virtuality is the cultural perception that material objects are interpenetrated by information patterns."[1] I believe it is this perception that best illustrates the conditions under which society interfaces with technology (or humanity interfaces with inhumanity). It is the pattern that I believe is as valuable, if not more, than the materiality or the object it communicates.

Color and language are methods for communication and the work accompanying this essay extracts them *from* communication. By alphabetizing iconographic documents, one may measure language as a priority for written communication much in the same way one may measure color for visual communication. By parsing the visible spectrum of color in a digital file, one may better understand the nature of an image as a digit rather than an image as an image. I am employing the same strategy that traditional darkroom and alternative process-oriented photographic artists create when their process is part of the finished piece. The electronic image made digital is *processed* differently than the chemical image made analogue. For example, the 90 degree angle is the signature "brush stroke" of the pixel. Is not the pica-liter sized ink jet dot mechanically analogous to the "expressive" rendering of a painting or darkroom print? Does "ink as jet" at all compare to paint or stroke as gesture? Clearly, the digital process mirrors the medium and the medium makes the message. The square RGB pixel is another way of making an image with a message and my work regards medium over message. As the work extracts language from communicative meaning, it additionally seeks to separate image from connotation (see Figure 1 After The Last Supper). I am shifting representation to re-presentation by sorting the same information into reconfigured sequences (see Figure 2 After The U.S. Constitution).

In this post-information age, data is transacted more than it is understood. How many readers can list the variety of phone numbers and/or e-mails attached to the names of the people with whom they communicate?

1 N. Katherine Hayles, "The Condition of Virtuality," *The Digital Dialectic: New Essays on New Media*, ed. Peter Lunenfeld (Cambridge: MIT Press, 1999), 88.

As technology, art, and media leave users with more questions than answers, it seems only natural and wiser to emphasize observation over definition. To that measure, language like definition is trying to catch up with newly developed media, but that is like trying to walk faster than one can run.

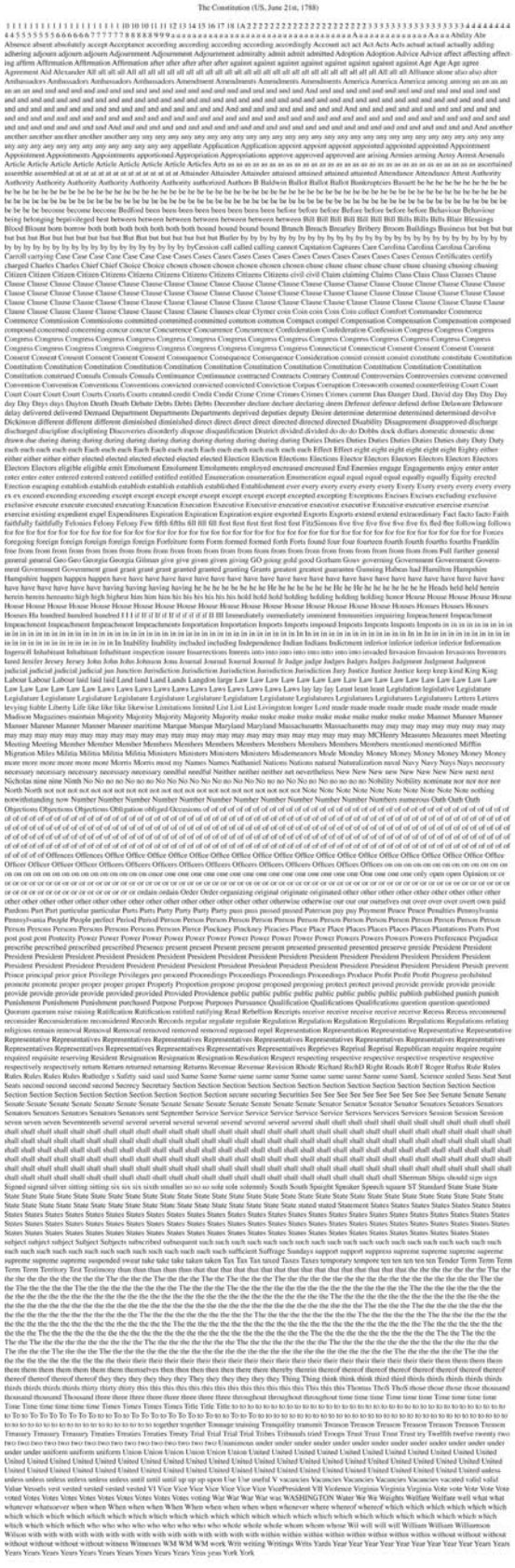

Figure 2 *After The U.S. Constitution,* (alphabetically ordered)

As technology, art, and media leave users with more questions than answers, it seems only natural and wiser to emphasize observation over definition. To that measure, language like definition is trying to catch up with newly developed media, but that is like trying to walk faster than one can run. It becomes self-defeating counter-intuition. New products and mediums are invented before the words we have to describe them exist. The mass of communication is not going to wait for its own re-definitions. Sitting still is not part of our negotiation with technology. By the time newly developed media is defined, it is different. If technology is not different, it is less new; if it isn't new, it is historicized and defined, which further expires it. If it's not new, it's not "now." Technology moves in cycles and replaces itself before it defines itself. The replacement is the definition. If a computer were "man's best friend" we would criticize it for unwanted or non-normative behavior – ignoring commands, crashing, slowly waking from sleep, etc. But who is training whom? Users know better than to *trust* computers. Yet they inescapably and faithfully couple with digital devices they can't trust. Given a choice, most people would walk away from a faithless situation. Yet choice is not a choice and faith is a less than wise strategy in digital culture. Like technology and innovation itself, the message behind communication has little time to mature. As systems of newly developed media subdivide, the signals they employ multiply. As we multiply signals, we further divide attention. The more we multiply a number, the more divisible it becomes. In many ways, mathematical figure and number is the metaphor for cognitive attention and its (life)span.

Computers oppose amnesia. The more pervasive the computer, the more expansive its reach into memory. In order to retrieve memory, we have to first classify it. In order to classify it, we have to fragment it, and fragmentation diffuses continuity. It is this structure that generates my curiosity and studio art (see Figure 3 *Slave Ship*). Marshall McLuhan stated that, "mechanization of any process is achieved by fragmentation, beginning with the mechanization of writing by movable types."[2] As an end user and participant of computational device and culture, I am most driven and fascinated by the solution and continuity society seeks in its dilution of the fragmented effect technology creates. We seek continuity and structure because technology does not and may likely never help us achieve it. Digital culture communicates by fractional, discontinuous methods. Static and corruption become part of our conversation.

2 Marshall McLuhan, *Understanding Media: The Extensions of Man* (London: Sphere Books, 1969 [1964]), p. 371.

As connectivity and bandwidth expand, this slowly shifting paradigm will evolve our present condition. Yet if we don't invest in our past, we will pay for our future. To understand the future is to glance in the rearview mirror. Users are more concerned with what lies ahead than what they leave behind. The greater the investment in the future, the greater the footprint of past activity becomes. While understanding data as information is important, the production of data has exceeded process. Volume has replaced feedback and navigation cedes to speed. Data as transaction has defeated data as information. This does not render information as useless, but it does render information as secondary to transaction. Go exceeds flow. Users and producers are sequencing frontiers that may someday self-dissolve because the promise of their art may be unsupported by future technologies. If the technologies we employ today aren't there tomorrow, how then do we share the message of a medium that no longer exists? No medium, no message. Think VHS, cassette, wax album, film camera, slide projectors, reel-to-reel film, photographic black and white paper, etc. Marshall McLuhan's now famous quote "the message is the medium," is greatly compromised by the absence of medium.

For example, many black and white photographers no longer have the option to communicate through the nuance of the black and white print because many of the products on which they relied no longer exist. This is a dangerous pattern that recalls a less recent one – art versus the history of art. Was there art before art history? Did they simultaneously emerge? If history can support art, then we can have art because we can remember art. And we remember art by recording art. It is a simple equation that has now become more complex because memory is now competitive and proprietary. Memory is for sale. Buy it. Sell it. Trade it. Clone it, or in the worst scenario, lose it. Never before have we had the elastic opportunities to do so much with memory.

In closing, it is the algorithmic formula for recording image, sound, and text as datagraphic memory that informs my work and my critique of digital culture. Memory is no longer Kodak's moment. Books are no longer information's victory. Composition is no longer the sole champion of audio's performance. As we yield to the digit, the cache of our present investment in future promise forms a catalogue of our intellectual capital, visual heritage, and collective experience – as pure digital rendering. Our data is our history is our data; and this is the condition, which has captured my intuition, creativity, and attention.

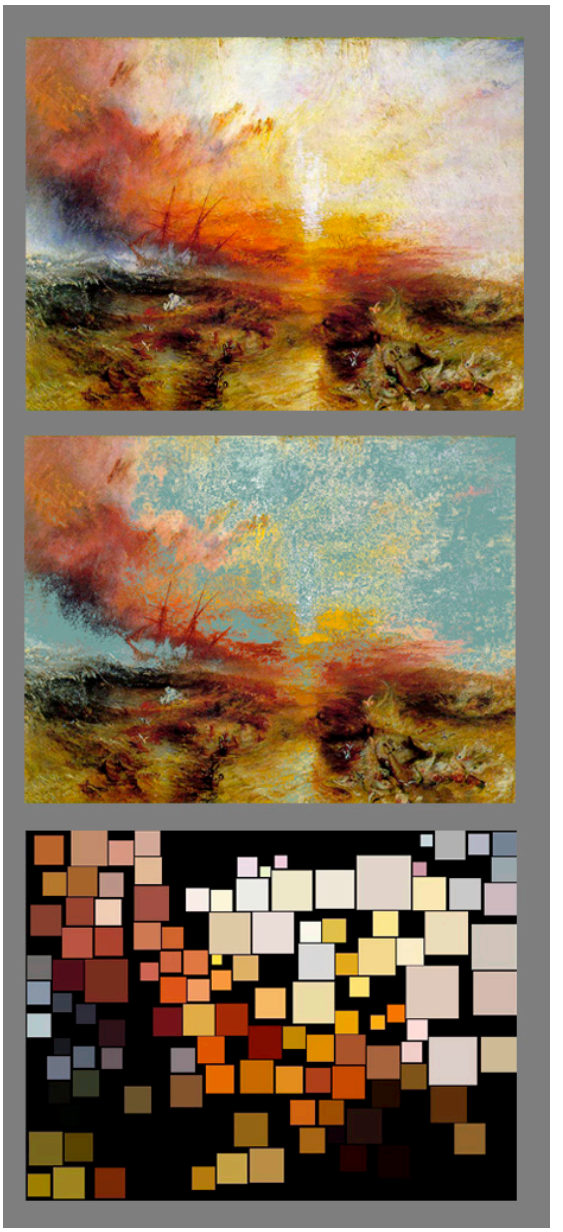

Figure 3 *After The Slave Ship*, Bill Davis (2005). The bottom image contains the discarded color missing from the top image, which originated from William Turner's *Slave Ship* painting.

Experience reminds us to remember. Computers remind us to package memory. This essay and the work herein is my attempt to show what that package would look like as arrayed, distilled, and opened – past (and) present.

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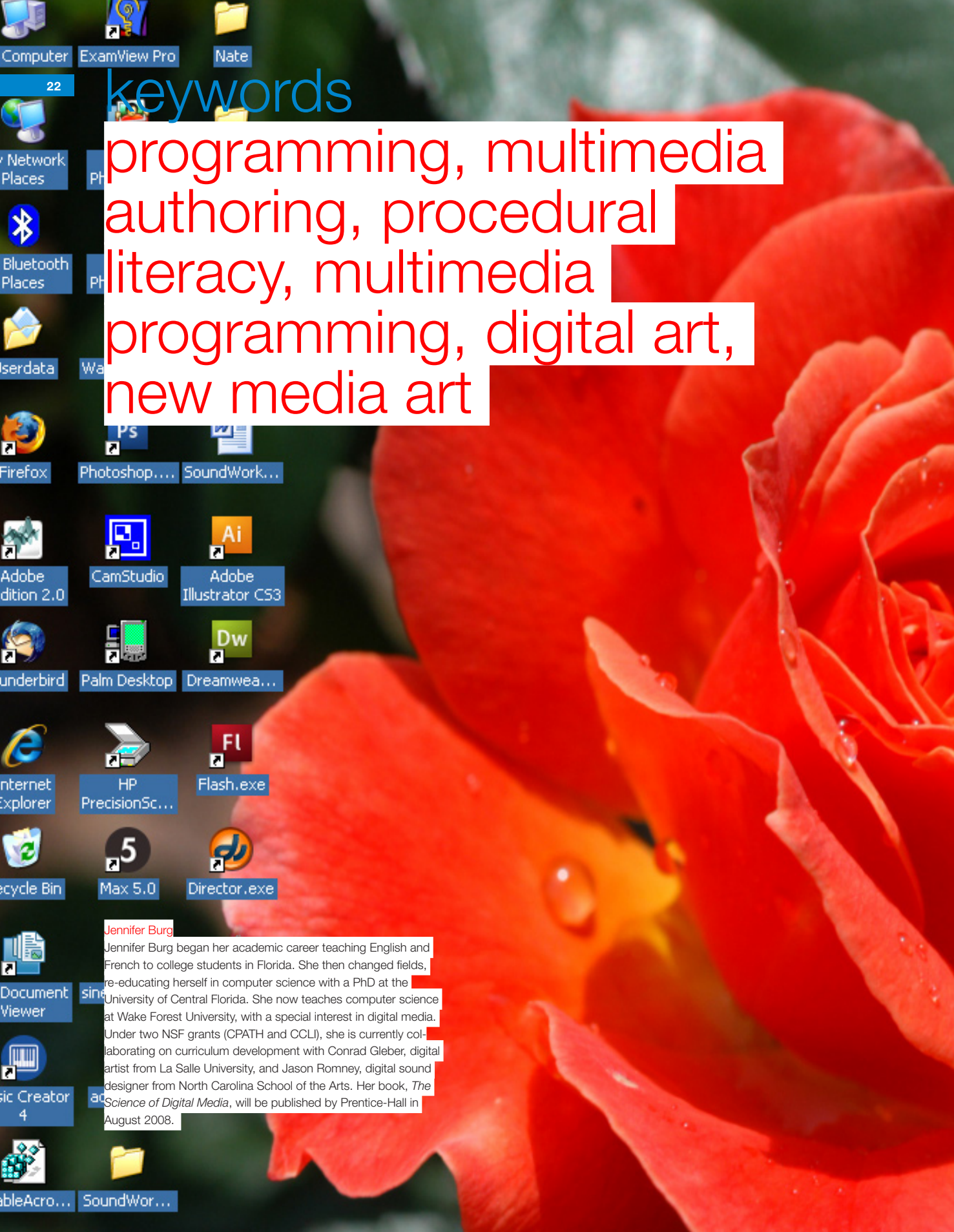
keywords

programming, multimedia authoring, procedural literacy, multimedia programming, digital art, new media art



Jennifer Burg

Jennifer Burg began her academic career teaching English and French to college students in Florida. She then changed fields, re-educating herself in computer science with a PhD at the University of Central Florida. She now teaches computer science at Wake Forest University, with a special interest in digital media. Under two NSF grants (CPATH and CCLI), she is currently collaborating on curriculum development with Conrad Gleber, digital artist from La Salle University, and Jason Romney, digital sound designer from North Carolina School of the Arts. Her book, *The Science of Digital Media*, will be published by Prentice-Hall in August 2008.

Teaching Programming to Students of Digital Media and Arts

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Digital media and arts courses lie at the intersection of art and science, theory and practice. When housed in an Art or Music Department, the emphasis in digital media and arts is naturally on theory, history, aesthetics, composition, design, and creativity. However, to have a full range of tools at their disposal, students need to venture outside of their usual artistic realm and perhaps outside of their comfort zone. In particular, learning the basics of computer programming gives students powerful new avenues for dynamic artistic expression. In this paper, we discuss why digital art and music students should learn how to program, what programming languages are suitable, and how programming can be introduced in a way that captures the students' interest.

Not all professors of art or music would agree that they should spend time teaching programming to their digital art students. First of all, programming may not have been part of their own educations. Secondly, time is limited. Theory, history, and traditional genres already fill up the schedule. So how can we justify adding this technical and, to some, rather unappealing subject to the digital art or music curriculum?

Does the artist really need to understand what's going on at the code level? What can the artist do with programming skills that he or she wouldn't be able to do otherwise?

The simple answer is that we're talking about a program in *digital* media and arts, and in this realm, programming is one of the most basic tools with which artists can express themselves. Mateas argues that all new media artists need *procedural literacy*[1] – the ability to solve problems in a logical, step-by-step fashion, which is, essentially, programming. Computer programming is a tool or instrument which–like a brush, pencil, violin, or piano–has its own characteristic expressions and timbre. But it's more than that. Computer programming also provides conceptual context, a realm of experience that can become the subject of art. We will try to illustrate both these points in what follows. The point is that before introducing the nuts and bolts of computer programming to art and music students, we need to motivate them by showing them just why they should invest time in something that otherwise may not seem interesting or natural to their "mindstyles."

Let's consider first the characteristic expressions made possible by computer programming, restricting the discussion to visual art for the moment. One fundamental element that distinguishes digital media from other visual art media is that it can be dynamic. Programming is what lends digital art its dynamism and motion. A program executes over time. As time passes, things change. Being able to program gives the artist control over how the changes evolve.

It could be argued, however, that digital artists can create dynamic pieces without *really* knowing how to program. There exist programming environments in which you can select items from a menu or palette, drop them onto a "stage," click on them and select a "behavior," and watch them do their thing. Many environments enable tweening–morphing an object from one shape, color, or position to another–by a simple menu selection. The authoring programs Director and Flash are such environments. This process of pointing and clicking and dragging and dropping is, underneath, computer programming, but the artist is sheltered from the details. Does the artist really need to understand what's going on at the code level? What can the artist do with programming skills that he or she wouldn't be able to do otherwise? Why should an artist learn Director's scripting language, Lingo? Or Flash's scripting language, ActionScript? Or Maya's scripting language, MEL? Why should an artist take the time to learn the fundamentals of computer programming?

Without an understanding of variables, flow of execution, iteration, conditions, functions, and assignment statements, the artist can use only the high level building blocks provided by the language environment–e.g., predefined behaviors that can be modified only by certain parameters. Producing dynamic artwork from these parts is like piecing together a house from modular, prebuilt components. Without the ability to program, there's a limit to the artist's originality and the extent to which he or she can control the creative process.

The ability to program gives artists a new language to speak, one based on loops, recursion, conditions, data, mathematical computations, and changing states. These basic elements of computer programming gives rise to what we have called programming's *characteristic expression*. A *recursive program*–where a process makes reference to itself until a base state is reached–can be reflected in a visible structure–one that is defined by itself until some primitive point. Fractals are a well-known example of recursive structures.[2] They can be as simple as the fractal tree structure in Figure 1 or as complex as the Julia fractal in

1 Michael Mateas, "Procedural Literacy: Educating the New Media Practitioner," *On the Horizon* 13, 2 (2005): 101-111.

2 John Briggs, *Fractals: The Patterns of Chaos* (New York: Simon & Schuster/A Touchstone Book, 1992).

Figure 2, but in either case, they are naturally generated by a recursive program. Koch stars (Figure 3) and Sierpinksi's gaskets (Figure 4) are other examples of simple recursive structures. Loops, recursion, and geometric computations give rise to spirals such as those in Figure 5.[3]

These images give just a preview of graphical structures that can naturally arise from computation. Artists can find a multitude of ways to give life and motion to such structures. Through the power of computer programming, their productions can be carefully crafted and controlled.

Then again, programming can give artists interesting ways in which to relinquish control. A program can be written to be non-deterministic, which means that its outcome is not certain because a random element has been introduced. Programs can also surprise the creator with *emergent behavior*. This is a situation where, again, the programmer isn't sure what the program is going to produce–not because of a random element, but because the relationship between the computation and the visual elements to which it gives rise is too hard to analyze. Mandelbrot fractals are a result of emergent behavior. How could one predict that repeatedly computing a simple assignment statement like $z = z^2 + c$ and assigning colors to pixels based on the result would produce the beautiful self-similar structures that Mandelbrot discovered? (The Julia fractal in Figure 2 is a variant of the Mandelbrot fractal.) Clifford Pickover has been toying with these mathematical and algorithmic wonders for years. His books–e.g., *The Pattern Book*, *Chaos and Fractals*, and a series of more recent ones–give inroads to the mathematical beauty that can be manifested through computer programs.[4]

Interactivity is another of the unique features available to digital artist programmers. Viewers and listeners of the art work–who we will call *players*–become collaborators in interactive digital art. The collaboration can be with the art work itself, where the player becomes co-creator. In the work of Peter Cho, the stroke of a mouse across an image triggers mathematical computation along the mouse's

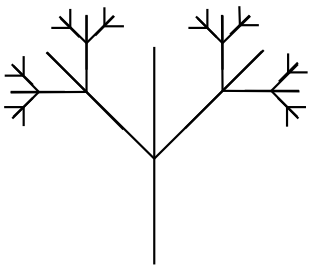

Figure 1 Tree fractal

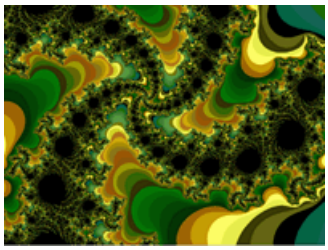

Figure 2 Julia fractal

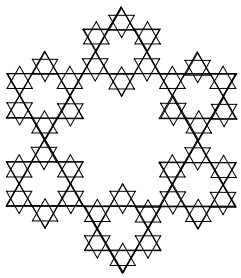

Figure 3 Koch star

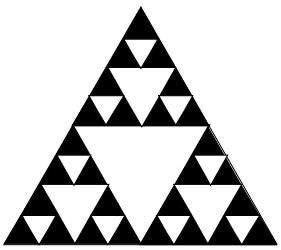

Figure 4 Sierpinski's gasket

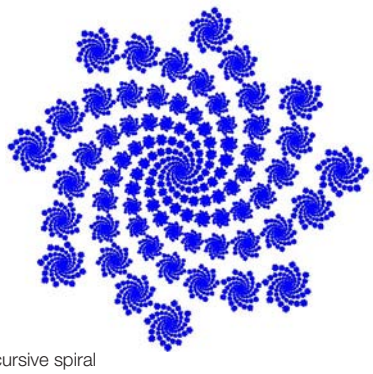

Figure 5 Recursive spiral

3 Istvan Hargittai and Clifford A. Pickover. *Spiral Symmetry* (Singapore: World Scientific, 1992).

4 Clifford Pickover, *The Pattern Book: Fractals, Art, and Nature* (Singapore: World Scientific, 1995) and Clifford Pickover, *Chaos and Fractals: A Computer Graphical Journey* (Elsevier, 1998).

path–cutting, smearing, and reweaving the image. With a mouse click on a different image, the selected area springs forward, leaving an onion-skinned trail as it ricochets from one edge to another.[5]

Alternatively, the collaboration can be between the player and the computer. An amusing example is "Agent Ruby's Edream Portal," a web-based reincarnation of the "Turing test." The original test proposed by Alan Turing had one human–a questioner–speaking to another human and a computer through an interface that hid the identity of the two being questioned. If the questioner could not detect from the answers which was the human and which was the computer, the computer was deemed sufficiently human-like to pass the Turing intelligence test. Through a web interface by Lynn Hershman, Agent Ruby invites you to type in questions and comments, her face blinking, smiling, and grimacing at you as she gives quite convincingly-human responses in real time.[6] Ira Greenberg's extensive work with the Processing programming language[7] illustrates the possibilities of creative interaction with the computer. His "Reo-Geo" offers controls for creating geometric forms of different colors, while "Dynamic Aesthetic Matrix" allows the user to pull on spinning balls in a dynamic spring-like web.[8]

Interactive visual art moves toward narrative in projects such as "World of Awe," an interactive story that allows the player to travel through a virtual space to explore "the connections between storytelling, travel, memory, and technology."[9] In the realm of sound, MAX/MSP[10] provides a platform for composing interactive music, as illustrated in Winkler's book and interactive concert.[11] In all these examples, the player interacts with the "system" which is, underneath, a computer program.

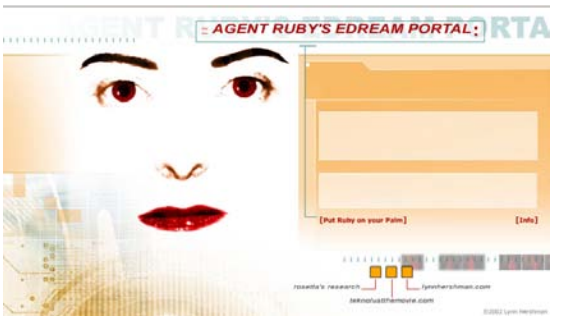

Figure 6 *Agent Ruby's Edream* Portal by Lynn Hershman

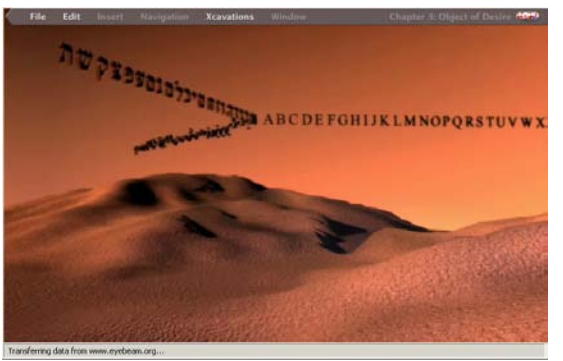

Figure 7 *World of Awe* by Yael Kanarek

As a third alternative, the collaboration can be between the player and other human players who together create images, sounds, music, or stories. The Princeton Laptop Orchestra illustrates this on a large scale, constituting a network of laptop computers equipped with programming languages such as MAX/MSP and ChucK and conducted by wireless connections.[12] The orchestra is put to use in "The Telephone Game: Oil/Water/Ether," which presents its players with "a custom flexible step-sequencer" to make music and sounds. The fun twist is that players can spy on each other through the network, appropriating and spinning each other's ideas. The intended result is that "unplanned

5 John Maeda, *Creative Code (*New York: Thames & Hudson, 2004), 79, and Peter Cho, "Portfolio: Numerical Photography, http://acg.media.mit.edu/people/pcho/portfolio/mas961.html (accessed June 2, 2008).

6 Lynn Hershman, "Agent Ruby's EDream Portal," (2001), http://agentruby.sfmoma.org/indexflash.html (accessed May 21, 2008).

7 Ira Greenberg, *Processing: Creative Coding and Computational Art* (Berkeley, CA: Friends of Ed, 2007) and "Ira Greenberg," http://www.iragreenberg.com/ira_greenberg_data/index.html (accessed June 2, 2008).

8 Ira Greenberg "Reo-Geo," http://www.iragreenberg.com/ira_greenberg_data/code/reo_geo/reo_geo.html (June 2, 2008) and Ira Greenberg, "Dynamic Aesthetics Matrix," http://www.iragreenberg.com/ira_greenberg_data/code/dam/index.html (accessed June 2, 2008).

9 Yael Kanarek, "World of Awe," (2001), http://www.worldofawe.projects.sfmoma.org/. (May 21, 2008).

10 "MAX/MSP/Jitter," http://www.cycling74.com (accessed May 25, 2008).

11 Todd Winkler, "Interactive Concert," http://www.brown.edu/Departments/Music/sites/ winkler//music/int_concert/index.html (accessed May 21, 2008), and Todd Winkler, *Composing Interactive Music: Techniques and Ideas Using Max* (Boston: MIT Press, 2002).

12 "The Princeton Laptop Orchestra," http://plork.cs.princeton.edu/ (accessed May 21, 2008).

Figure 8 Princeton Laptop Orchestra

structures begin to emerge, like oil on water, as riffs propagate and evolve, sometimes returning unrecognizable to their creators."[13]

Thousands of digital media productions such as these can be found all over the web. We give just a few examples to illustrate the point that these are the characteristic expressions of digital art: dynamism; control in tension with non-determinism and emergent behavior; interactivity; and collaborative engagement of the player in interaction with the artwork, the system, or other human players.

In addition to its characteristic expressions, computer programming situates the artist in a new conceptual realm where the language, its structures, and the flow of data become not just the medium of expression, but also its subject. We have yet to get over the novelty of our "second life," the new and pervasive digital environment of email, the web, cell phones, wireless communication, and virtual reality. Artists reflect this preoccupation in their work, making digital media not just the media but the message. Benjamin Fry conceives a web server as "an elegant computational organism," a globe-spanning system whose activity is visualized as growing and atrophying based upon its widespread interactions. Computer typography is "a writhing … creature that grows as it traverses the web hungry for new information to assimilate into its form."[14] In a piece called "Power Structures," participants are invited to contribute information about the people and events that tie them together, and maps are produced from this to act as "narrative structures outlining the flow of influence" and "the network of power brokers" that influence our daily lives.[15] "Inventor's Network" displays inventors as nodes in a web of interactions where colors and sizes represent age and importance of collaborations.[16] "Themail" and "The Mountain" visualize email archives over the years.[17]

13 The Princeton Laptop Orchestra, "The Telephone Game: Oil/Water/Ether," (2007), http://transition.turbulence.org/Works/plork/ (accessed May 21, 2008).

14 Benjamin Fry, quoted in John Maeda, *Creative Code,* (New York: Thames & Hudson, 2004), 59, 102.

15 Aaron Siegel, "Power Structures," (2008), http://rhizome.org/profile.php?user_id=1027584. (May 21, 2008).

16 Lee Fleming and Matt Marx, "Evolution of Inventors Network," (2006), http://www.visualcomplexity.com/vc/project_details.cfm?id=546&index=546&domain (accessed May 23, 2008).

17 Fernanda Viégas, "The Mountain," http://alumni.media.mit.edu/~fviegas/research.html. (accessed May 21, 2008), and Fernanda Viégas and Scott Golder, "Themail," http://alumni.media.mit.edu/~fviegas/research.html (accessed May 21, 2008).

Martin Wattenberg, whose work ranges from artistic visualizations of stock market data[18] to dynamic representations of the thinking process of an intelligent chess program,[19] observes:

We can take enormous data sets and present them in a spectacular array of ways. They can be space-filling, three dimensional, hyperbolic, zoomed in or out of, or drilled into. But they can also fail in a variety of ways: by being cluttered, obscure, labyrinthine, or dizzying…. As a designer, I take comfort in the thought that while hidden pitfalls await, so do hidden treasures.[20]

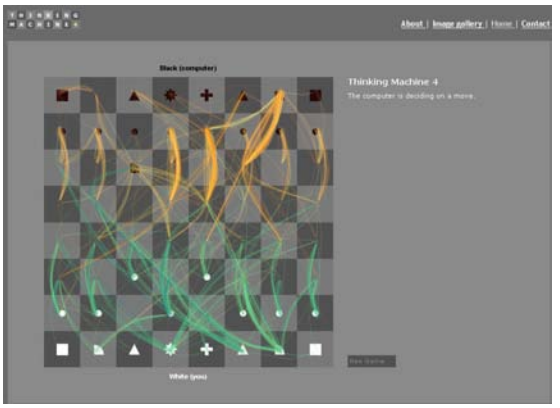

Figure 9 *Thinking Machine* by Martin Wattenberg

We need to convince students that in order to unlock these hidden treasures, they first need to spend some time with what might seem rather mundane and uninspiring nuts and bolts of computing programming.

How Can Computer Programming Be Taught to Students of Digital Media and Arts?

So how do we get students of music and art to the point where they can take advantage of this new tool, computer programming? The trouble is that there can be a big disconnect between creative experimentation in digital art and the not-so-exciting programming concepts that put an artist on the path to this type of creativity.

Consider list of basic programming concepts that are necessary starting points:

- **algorithms** *(logical, step-by-step methods for solving problems)*
- **top-down design** *(looking at a higher level abstraction first and moving progressively to lower levels of abstraction)*
- **object-oriented programming** *(a programming style where entities in a program are thought of as objects that have properties and actions they can do)*
- **variables** *(places to store, change, and access values)*
- **assignment statements** *(ways to change the values of variables)*
- **functions** *(reusable, encapsulated methods for doing something in a program, often returning a value)*
- **parameters** *(values sent into a function)*
- **loops** *(actions in a program that are repeated a set number of time, with changing values)*
- **conditions** *(ways to control what happens in a program based on "if" something is true)*
- **flow of control** *(the sequence of steps that a program goes through based on the conditions, loops, etc. that it encounters)*
- **recursion** *(a function that calls upon itself until some base case is reached)*
- **mathematical expression** *(expressions like x = y –2)*
- **Boolean logic** *(a complete system for logical operations based on knowing whether basic elements are true or false and then looking at their truth value when they are combined with "and," "ors," "nots," etc.)*
- **events** *(things that happen in a program that trigger other things – like a mouse movement or a keystroke)*
- **basic syntax** *(the required order of variables, numbers, punctuation, keywords, etc. in a program)*

Yawn, says the artist. Unless these concepts are motivated by examples and programming assignments that are visual, aural, dynamic, and interesting to the artist, there isn't much hope for inspiration.

Computer science professors have realized the need for more relevant curriculum even among their own non-art students. The move in computer science education in the last five years has been toward interdisciplinarity and multimedia programming environments. Recent first semester programming textbooks use languages that lend them-

18 Martin Wattenberg, "Map of the Market," (1998), http://www.smartmoney.com/map-of-the-market/ (accessed May 23, 2008).
19 Martin Wattenberg, "Thinking Machine," (2003), http://www.bewitched.com/chess.html (accessed May 23, 2008).
20 Martin Wattenberg, quoted in John Maeda, *Creative Code* (New York: Thames & Hudson, 2004), 78.

language	level of abstraction	style of programming	media supported	extensibility
Alice1	high	drag-and-drop environment; built-in behaviors; Java-like code is “fill in the blank” with basic structure provided; object-oriented	3-d objects, sound, video, images	additional 3D models can be imported
C/C++ with MFC or X Windows	low	imperative (C) or object-oriented (C++)	various media supported at a low level of abstraction	can be extended with additional libraries
Director	high; lower possible with scripting language, Lingo	drag-and-drop environment with many built-in behaviors; Lingo offers choice of JavaScript syntax or traditional dot syntax; choice of imperative or object-oriented style	optimized for bitmap images, video; handles digital audio well; can handle MIDI with Xtras; Flash vector graphics can also be included	can be extended with Xtras and new components
Flash	high; lower possible with scripting language, ActionScript	drag-and-drop environment with many built-in behaviors; ActionScript uses JavaScript syntax; choice of imperative or object-oriented style	optimized for vector graphics; handles low-res video well; handles digital audio well; excellent for web-based productions	can be extended with third-party extensions and new components
Java	medium	object-oriented	AWT and JMF packages facilitate GUI building and inclusion of images, sound, and video at a medium level of abstraction	can be extended with new classes, packages, and APIs
Python	medium to high	object-oriented, imperative, and functional	extensive graphics, sound, video, and 3D capability	Core Development group encourages users to fix bugs and add features
Processing	high	object-oriented	designed for artistic experimentation with bitmap images	can be extended with new classes, packages, and APIs
Max/MSP/ Jitter	high; lower possible when interfaced with C, Java, and JavaScript	visual programming environment where built-in components are placed in a Patcher Window and their inputs and outputs linked	Max for MIDI; MSP for digital audio; Jitter for 2D and 3D images and video	C and JavaScript code can be written to create additional components

Table 1 Comparison of some current multimedia authoring environments, Part 1

language	platform	distribution means	support for concurrency	support for network communication
Alice	Windows, Mac, Unix, Linux	Web-based applets	made easy with built-in “do it together” program blocks	
C++ with MFC or X Windows	Windows, Mac, Unix, Linux	platform-specific executable	low-level threads	sockets and client-server model
Director	Windows, Mac; can be played on Linux	DIR is native file format; EXE or OSX is stand-alone executable; DCR is Shockwave format for web	MIAW (Movie in a Window) can run concurrently with main movie	NetLingo for network operations
Flash	Wiindows, Mac, Unix, Linux	FLA is native file format; EXE or HQX is stand-alone executable; SWF is format for web; MOV is a QuickTime movie	A movie clip serves as a movie within a movie, having its own internal timeline	NetStream and NetConnection classes
Java	Windows, Mac, Unix, Linux	compiled into platform independent bytecode; can be distributed as an application or an applet for the web	Thread class, synchronization mechanisms	Client, Server, and Socket classes
Python	Windows, Mac, Unix, Linux	compiled to bytecode; program can be run by an interactive Python interpreter or distributed as an executable file	Thread and Queue class	Socket module
Processing	Windows, Mac, Unix, Linux	compiled into platform independent bytecode; can be distributed as an application or an applet for the web	same as Java, though the intent of Processing is to shelter the user from lower-level details	
Max/MSP/Jitter	Windows, Mac	platform-specific executable	some inherent concurrency, but not controlled explicitly as such	Network objects in Jitter
ChucK	Windows, Mac, Linux	Compiled to bytecode that is run by the ChucK VM (virtual machine)	The VM can run multiple programs in parallel; concurrency through Shreds; events can be broadcast	Full OSC support for networking

Table 2 Comparison of some current multimedia authoring environments, Part 2

selves to early production of multimedia elements and are illustrated with assignments that manipulate colors, sound, and dynamic objects, often through graphical user interfaces.[21]

To capture the interest of art and music students, it's essential to begin by showing examples of the works that can be created through computer programming–works like those outlined in the section above. As learning proceeds, programming concepts need to be linked to visible, audible, playable products, even though they may be simple in the beginning. (What those "good" programming assignments might be could the subject of a whole other paper–but looking at some of the recent programming textbooks gives you an idea. The language websites for Processing, Python, Alice, Flash, and Director also have abundant examples.)

Choosing the right introductory language for digital artists is equally important. Many good choices are available, varying in level of abstraction, suitability for different media, and so forth. Here are some of the important criteria to consider in the choice of a programming language for digital media and arts students. More details on these considerations can be found in *The Science of Digital Media*.[22]

> **Level of abstraction and ease of programming**. *Drag-and-drop, point-and-click, with built-in behaviors, or lower level with more code-writing? Is there an integrated development environment (IDE)?*
> **Media supported.** *Does the language support vector graphics? Bitmap images? Sound? MIDI? Video? Interactivity? 3D?*
> **Programming paradigm.** *Is there a scripting language? Does it support object-oriented programming? Is it an event-based language?*
> **Extensibility.** *Can you add features to the language or environment with additional third-party plug-ins or extras?*
> **Execution efficiency of the language.** *(Some languages can handle complication mathematical computation better than others in that they execute faster.)*
> **Cost.** *Is the language or environment freeware? Shareware? A commercial product?*
> **Language stability.** *Is it standardized? Still rapidly changing versions?*
> **Memory requirements.**
> **Platform.** *What operating system does the language run under?*
> **Distribution means.** *What options do you have for distributing your multimedia production, in terms of both operating system and distribution media like web, CD, DVD, etc.?*

Tables 1 and 2 give an overview of the features of some of the currently most attractive programming language environments for students of digital media and arts.

In the opinion of the author, the languages break down as follows:

Alice is a good teaching language/multimedia environment in that it quickly allows students to create fun 3-D projects while illustrating basic programming constructs. Projects can be made into web applets, which is additionally motivating because students can share their work. However, students sometimes get distracted with the visual 3-D element at the expense of concepts. Also, Alice creates programs of a certain consistent 3-D look, so the usefulness of this language alone for creative exploration is limited.

The syntax of **C/C++** is too abstruse and fussy as an introductory language for digital media and arts students.

Director is excellent for bitmap graphics, sound, and video, and it also has a 3-D component. Flash objects can also be integrated. Programming can be done at a high level of abstraction with a timeline, tweening, and built-in behaviors, or students can descend to the scripting language, Lingo, which can be programmed in procedural or object-oriented style. However, Director is expensive, and one sometimes wonders about its longevity because of the dominant interest in its cousin, Flash.

Flash is excellent for vector graphics, sound, and video and web-animations with small file sizes. Like Director, Flash allows you to program at a high level of abstraction with a timeline, tweening, and built-in behaviors, although the programming metaphor is different. With Director, the metaphor is "actors, called *sprites*, on a stage that is arranged frame-by-frame via a timeline." With Flash, the metaphor is "graphical objects drawn on sheets of acetate, one laid on top of the other, these objects tweened separately." Flash's use of "timelines within timelines" by means of movieclips facilitates concurrent animation. Flash's

21 Wanda Dann, Stephen Cooper, and Randy Pausch, *Learning to Program With Alice,* 2nd edition (Prentice-Hall, 2008) and Mark Guzdial, *Introduction to Computing and Programming In Python: A Multimedia Approach* (Upper Saddle River: Prentice-Hall, 2005).

22 Jennifer Burg, *The Science of Digital Media* (Upper Saddle River, New York: Pearson/Prentice-Hall, 2008).

scripting language, ActionScript, is a full-featured language that can be written in procedural or object-oriented style. Flash/ActionScript is catching on in computer science departments as an introductory programming language because students can create interesting multimedia programs while learning the language fundamentals.

Java is a good language if you want to be in that intermediate ground between a high and low-level of abstraction. It is an object-oriented language that has a large number of classes packaged with it. This is both a good and a bad point. It's good in that there are classes for GUIs, bitmap graphics and vector graphics, sound, video, network communication, and concurrency. It's bad because there's a big learning curve for students as they familiarize themselves with all these packages of classes at the same time that they are trying to grasp the object-oriented paradigm and learn the basic programming constructs. An advantage of Java is that programs can be compiled to executable form in the traditional way, or as an alternative, they can be written as applets to be executed from web pages.

Python[23] is also catching on in computer science departments. It is a palatable language for digital media and arts students because of its English-like syntax and features for multimedia programming. Python runs on all major platforms and is free, open-source software. It's a good possibility as a first language for art students.

Processing[24] was designed particularly for art students as a language with which they can manipulate bitmaps in creative ways while learning fundamental programming concepts. Built on top of Java, Processing shelters the programmer from some of the messy details in Java–e.g., ActionListeners that have to be applied to objects to "listen" for events like mouse clicks and keystrokes. Processing is primarily a learning environment–a good introductory one for visual art students, but one from which they would want to advance to other more flexible platforms.

MAX/MSP/Jitter is a visual programming environment for MIDI, audio, and video (respectively). It allows the programmer to work with high level MIDI, audio, or video objects that are linked with patch cords–a metaphor that simulates real-world hardware connections in a way that makes sense to beginning audio programmers. All the basic programming constructs can also be applied–conditions, loops, mathematical expressions, and the like–and the programmer can also descend to Javascript or C++ modules. This is an excellent environment where students of digital sound and music can experiment in ways that help them understand the nature of MIDI and digital sound; how filters, EQ, pitch shifts, compression, and the like operate at the algorithmic or mathematical level; and how sound can be manipulated creatively at a lower level of abstraction. The visual user interface makes it easy to write the first "programs." However, the difficulty level quickly increases as concepts of programmer are intertwined with concepts of digital sound and MIDI.

ChucK (created by Ge Wang, Perry Cook, et al.)[25] is an interesting audio/MIDI manipulation program at a lower level of abstraction. Those who have used it with students report that the students learn ChucK quickly and can go far with it. It has potential for creative exploration in the area of digital sound.

Last Thoughts

Having said all this–trying to find a way to interest students of digital media and arts in learning how to program–we have to add that the dichotomy between "art" and "science" students is often drawn too sharply. In the author's experience in interdisciplinary courses, many art students take to programming, logic, and mathematics quite handily; and many computer science students also play musical instruments, sing and act, and have an artistic sensibility. This paper focuses on reaching those students for whom programming has little interest or attraction, bringing them into the fold, and leading them to the point where they have a new very powerful creative tool in their grasp. In order to teach programming effectively to students of digital media and arts, instructors first need to educate themselves in the types of works that can be created with multimedia programming and the languages that can take students to that point. It's an innovative field, both intellectually and artistically stimulating, and learning about it is worth the effort.

23 "Python," http://www.python.org/ (accessed May 25, 2008).

24 "Processing," http://processing.org/ (accessed May 25, 2008) and Casey Reas, Ben Fry, and John Maeda, *Processing: A Handbook for Visual Artists and Designers* (Boston: MIT Press, 2007).

25 "ChucK," http://chuck.cs.princeton.edu/ (accessed May 25, 2008).

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keywords

digital aesthetics, digital exhibition, digital arts, traditional arts, digital media, new media, digital photography, digital painting, digital installation art, digital animation, digital interactive art, digital video

Dena Elisabeth Eber

Dr. Dena Elisabeth Eber, Division Head, Digital Arts and Associate Professor, Digital Arts since 1997. For her Ph.D. research, Dr. Eber explored the art and aesthetics of artistic virtual environments (VE). Her other research includes perception and the creative process surrounding other digital media. She has presented this work at national and international conferences and has many publications in national and international journals. She also curates international digital exhibitions such as SIGGRAPH and the International Digital Media and Arts Association's (iDMAa) iDEAs. Dr. Eber's artistic endeavors include VE art works, imaging, and interactive installations shown at international, national, and regional exhibitions.

Review: *iDEAs 07: Beyond Boundaries*

Dena Elisabeth Eber, Curator
Division Head, Digital Arts and Associate Professor

The iDEAs 07: Beyond Boundaries exhibition, which was on display at the F.U.E.L gallery in Philadelphia in November 2007 to coincide with the International Digital Media and Arts Association (iDMAa) conference, helped frame the niche that digital media has carved for itself in the continuum of art. The exhibition addressed the notion that the nature of digital arts is to embrace the new technologies of the time while perfecting those of the past. As such, it tends to sit outside the margins of discipline, thus defying boundaries within its own set of standards. Although all the works in the exhibition were a part of this forward thrust, the following pieces exemplified the trend. They included a rich mix of interactive works, video, installation, animation, imaging, and sound.

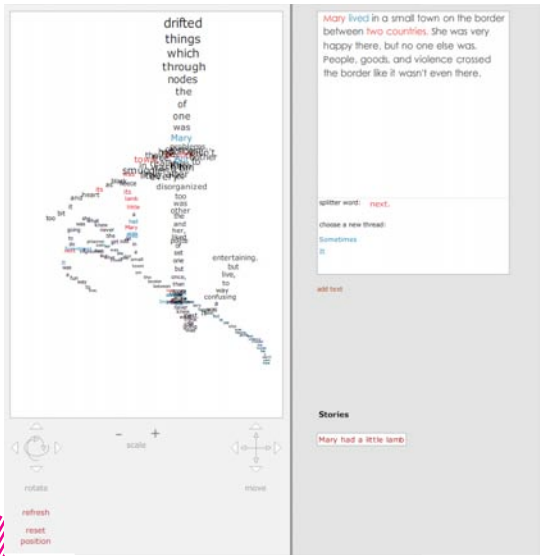

Figure 1

Seth Ellis' *Story Engine* (figure 1) is a desktop interactive work reminiscent of the Exquisite Corpse taken to a new level. The Exquisite Corpse game was developed by the artists and writers associated with Andre Breton's surrealist group during the early twentieth century. In the original game, writers added text to words already in place from the last writer without knowing what the previous words were. In the end, a new sentence (or story) was formed, one without a single author and one with text that made sense only in relation to the words around it. Seth Ellis borrowed from this game but extended it as an artistic visualization that continually expands and is infinitely navigable. Because of the technology, authors may add and build on the text without the need to delete what has come before. Users can then navigate through the many lines and associations as one narrative can spawn many that contain narratives within. The resulting text is not only rich in multiple threads, but it creates an appealing and unpredictable formal spread of color and space made possible by technology. In the strictest sense, this is a text based visually interactive narrative in which the author/artist gives up control to the next author/artist or participant, thus surrendering to the postmodern assertion that the author/artist is no longer at the helm.

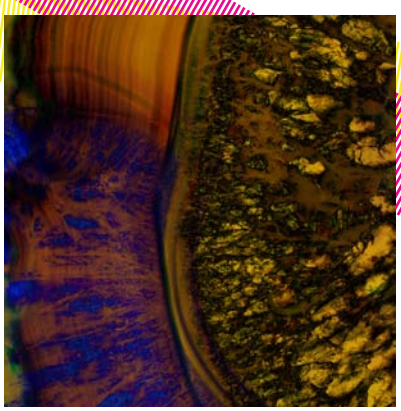

Figure 2

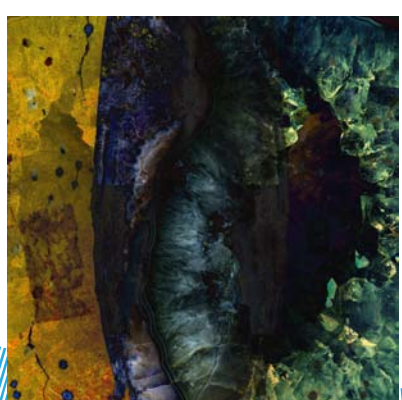

Figure 3

Carol Farber's images (figures 2 and 3) also borrow from the established painterly and photographic aesthetics, but cross boundaries into a realm that embraces the manipulated referent to create a new truth. In *Surface 3* (figure 2) and *Surface 1* (figure 3) Farber uses nature as a reference to inform color and texture taken further with digital imaging. *Surface 3* is reminiscent of a tree or a slice from a tree and *Surface 2* clearly uses a geode as source material, but both push the traditional photographic image into an extended representation that is a painterly interpretation of the object. Nature has always been a reference, but the suggestion of a photograph that is digitally manipulated frees the artist to combine digital with traditional techniques to further extend relationships and to suggest another reality. The works are abstract; yet reveal an essence and an allusion to nature. Much like Monet's impressionistic interpretation of atmosphere, the images are an interpreted vision of nature. These works are neither photographs nor paintings, but sit past the edge of both disciplines by borrowing aesthetics and moving forward.

Ellen Jantzen (figure 4), Qian Li (figure 5), and Kel Smith (figure 6) are other artists in the exhibition who, like Farber, work with digital imaging to find a place beyond photography, painting, and drawing. Jantzen (figure 4) turned photographic truth on its head by making images that look photographic, but are clearly an imagined reality fabricated in digital space from a disassociated object. Li (figure 5) mimicked painterly forms using digital paint and photographic approaches to create abstract images that suggest the movement of dancing figures. Smith (figure 6) used a custom built digital camera fashioned from a scanner to show objects that are defined only by the contrast of the light that hits their edges and the dark of the space around it. The shapes appear to be floating in a dimension captured in time by the artist. As with Farber's images, these works provide more examples of the moving artistic boundary.

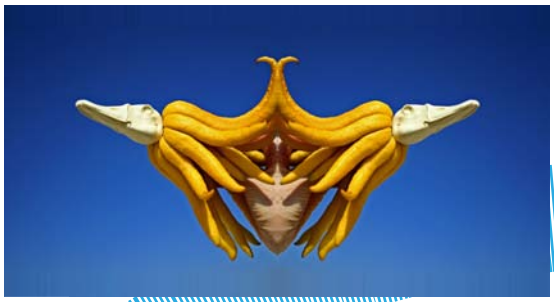

Figure 4

Figure 5

Figure 6

Animation is another tradition that has settled into a new paradigm since the widespread implementation of computer graphics.

Animation is another tradition that has settled into a new paradigm since the widespread implementation of computer graphics. This new framework is characterized by hyper-real representations of characters and environments, and dramatic effects that were very difficult if not impossible to create prior to digital animation. However, the technology affords even more possibilities than the strict continuation of traditional animation. Both LiQin Tan (figure 7) and Anthony Fontana (figure 8) created works that exemplify some of this potential. In the animation installation *Rusty Faces,* Tan used digital metal printing and digital simulation of rust to metaphorically show the physical and mental regression of humans. The animations deteriorate a brain and degenerate solid forms to rust as, thanks to the use of LCDs, the wall-mounted image transforms in real time. This is neither print nor animation, but extends both to provide an expressive experience with motion, physical objects, and simulations.

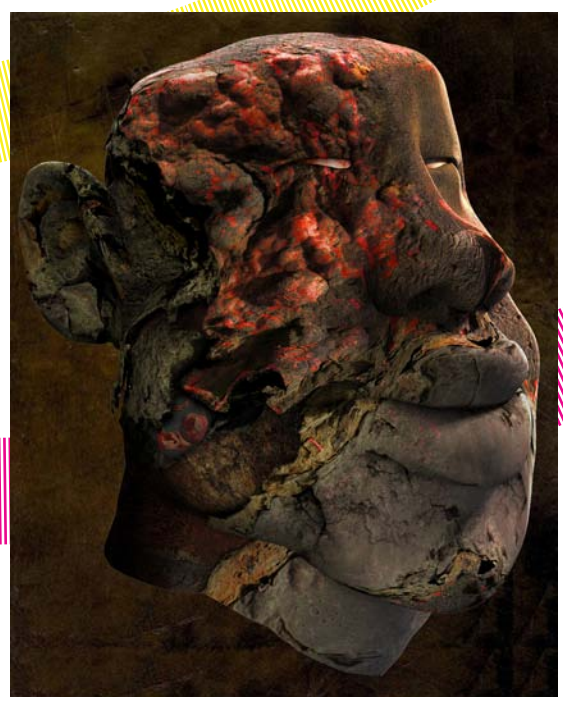

Figure 7

Figure 8

Fontana takes another approach with his machinima animation, *Machinima Paradiso*. Machinima is a play on "machine-made cinema" and uses a real-time 3D gaming engine to create narratives and images. This practice stems from online role-playing games such as Second Life in which the participant creates her digital self as an avatar using the modeling tools provided by the engine. Participants can then create a flow of events from this role playing and narrative mix. It thus empowers artists to create machine driven real-time animations that can be captured and later presented as an animation. Fontana's work plays on the notion of art in virtual space as his avatar, or self, is represented as a form of art, thus redefining the "self-portrait as art" as part of the digital gaming culture.

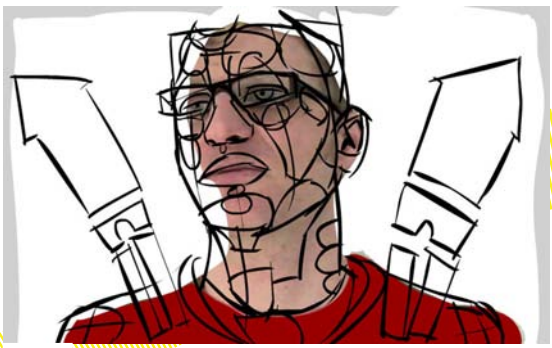

Figure 9

A number of artists use the digital capabilities of video editing to create cinematic experiences in a number of non-narrative and narrative ways that reference our preconceived notions of narrative film. Artists who approach their work from this angle in the *Beyond Boundaries* exhibition include Shellie Fiocca (figure 9), Christopher Cassidy (figure 10), and the collaborators Brigid Maher and Leena Jayaswal (figure 11). Fiocca (figure 9) mixed traditional drawing with video to create a more intimate form of narrative, a kind of distorted third-party storytelling. In this way she used digital media to reconstruct her memory, which was represented as videos of people responding to her statements. Fiocca then digitally re-edited them with animated drawings to express her intended meaning of struggle and strength that she had when she wrote the statements. Indeed these techniques were possible prior to digital editing, but they were less likely and certainly more complex. The digital editing allowed Fiocca to later cull the videos for what she remembered as her meanings, thus using the technology as an auxiliary memory.

Figure 10

In *The Isthmus of Kansas* (figure 10), Cassidy used video editing and projection to create an experience of possibilities, or what might happen in the future if our sea levels rise to diminish the United States into a single strip of beach. Cassidy juxtaposes orthogonal footage from the Atlantic and Pacific oceans and then projects them to flatten and simplify the space, causing the viewer to contemplate the source of this beautiful and meditative projection. It is only after the formal experience provided by the technology wears thin when the viewer is faced with the reality of the implications of such beauty. Although the media does not define this work, the technology facilitates the relationships through a novel experience.

In *The New "F" Word* (figure 11), Brigid Maher and Leena Jayaswal also used digital editing and juxtaposing to force relationships, but instead of oceans or drawings, they were spoken dialogues and associated imagery. The new "F" word for generation Y is feminism, and the video shows interviews of women from this generation speaking about how feminism relates to them. Their words and perceptions are put into context with corresponding mixed media footage that includes historical clips from the women's rights movement, contemporary clips of controversies dealing with gender issues, and current protests. The work connects the past and the present, both in technology and in ideals. The relationships formed using the technology of the past and the present lay the groundwork for current feminist perceptions.

Figure 11

Installation and performance art enjoy a long history that has roots in ceremonies (performance art) surrounding the creation of cave paintings (site specific installations) in ancient times. New media provide even more ways to create installation and performative works. This exhibition includes two installation works that exemplify some of these ways. In "We," (figure 12) Yevgeniya Kaganovich, Dale Kaminski and Mat Rappaport used sound created by visitors to the exhibition that was collected via weather balloons positioned throughout the gallery. The samples created an idealized averaged sound that a single privileged participant was able to hear though a headset. The balloons represented the surveillance space and the average of their sound represented the idealized citizen.

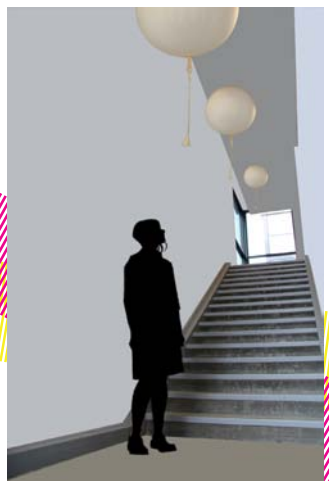

Figure 12

Matt Kenyon used micro-printing technology to infiltrate Capitol Hill with his site-specific installation, *Notepad* (figure 13), which enlisted unsuspecting performers to carry out the act. Kenyon created yellow legal notepads made up of lines that, upon inspection, looked completely normal. However, the lines were actually made up of micro-printed text of the personal details of Iraqi civilian casualties. Kenyon printed notepads in editions of 100 and covertly distributed them to the United States Congress, thus circulating unacknowledged body count data through Capital Hill. Kenyon represented this installation and performance with his display of the legal pads in the *iDEAs07* exhibition. The pads were equipped with a digital magnifying glass that displayed the enlarged text from the lines on a computer screen. This guerrilla-like approach to infiltration was made possible through digital technology, thus the digital became the facilitator in the process of this work.

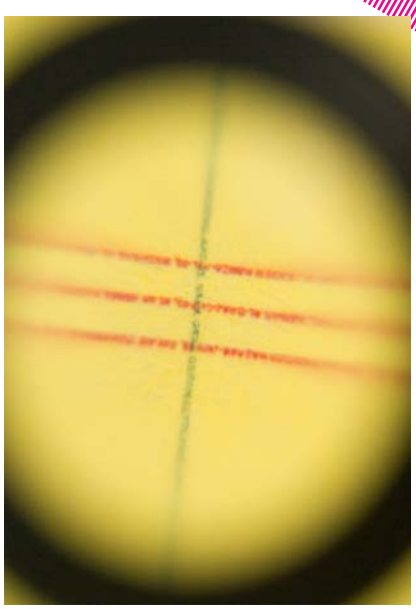

Figure 13

Figure 14

Figure 15

Figure 16

The animations, images, videos, interactive works, and installations I presented here are only a small selection of pieces that collectively contributed to positioning digital media arts beyond a definable artistic boundary. The works in the exhibition challenged this traditional "line in the sand" in similar ways. Other works included Dylan Morre's *Fields* (figure 14), which was a moving digital painting that slowly changed over time, thus creating for the viewer an awareness of being in an actual, yet digitally abstracted field. In *Beyond this Point* (figure 15) Anna Ursyn used digital imaging techniques to compare the regularity of nature with human constructions, both physical and intellectual. By putting the imagery in close proximity, she forced relationships to read as symbols that formed sentences. Jack Stenner's *Honeypumper: Moment of Absence* (figure 16) is an interactive installation that used technology to force the participant to question presence though absence. When the participants approached the pump and monitor on the floor, they immediately saw themselves in the space of the gallery on the screen. However, as they pumped, their image disappeared but the environment remained. The image of the person was stored forever in the biosphere, thus referencing Joseph Beuys' seminal *Honeypump in the Workplace* in which the "honey" that flowed through the work was the invisible creative energy in the air created from the social interactions of the larger society.

The art from the iDEAs 07: *Beyond Boundaries* exhibition was complex and multifaceted, however, it embraced two distinct aspects that are currently, and will continue to be, characterized by flux and defined by the rate of change of technology. The first exists on the fringe of the art world, embracing, exploring, incorporating, and translating the newest digital media for the given time. The second is the molding of yesterday's digital "edge" into *traditional* art forms or into mature and unique works that often do not fit within traditional aesthetics.

Regardless of whether the art includes older or newer technologies, digital media art sits outside of tradition. It is a lightning rod for new media and acts as a disseminator of language and implications connected with it. Although traditional boundaries do not apply, grounding in artistic practice does, albeit in flux.

As the works in this exhibition show how digital media art crosses traditional aesthetics, so too were new ones created, however, they remain flexible and open. They are not boundaries, only guides to inform future artistic expression facilitated by digital technologies.

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Keywords

database narrative, interactive cinema, interactive narrative, interactive video, micronarratives, split-screen, user interface

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Kirsten Johnson is a Masters student at the School of Interactive Arts and Technology at Simon Fraser University, Canada. Her research interests include interactive narrative for cinema and hyper-video. As a media artist she has developed and produced her own films and interactive media, including her interactive short film Lost Cause. Her professional background is in web development and design.

Jim Bizzocchi

Jim Bizzocchi is an Assistant Professor in the School of Interactive Arts and Technology at Simon Fraser University. He conducts research in three areas: the future of the televisual, interactive narrative, and game design. He teaches courses in New Media, Interactive Video, and Narrative, and is the recipient of a University Award for Teaching Excellence. He is a practicing video artist and was recently awarded an artistic residency at the Banff New Media Institute, where he finished the principal shooting for the latest work in his “Ambient Video” series

Lost Cause: An Interactive Film Project

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School of Interactive Arts and Technology, Simon Fraser University

The paper describes the design, aesthetics, and experience of the interactive film *Lost Cause*. The film is examined from several theoretical perspectives: cinematic roots, narrative construction, interface design, and new media artifact. *Lost Cause* extends the complex plot structure used by filmmakers such as Altman or Tarantino into an explicitly interactive format. The plot has three inter-related and synchronous threads which are represented in a multi-screen user interface. It culminates in an ending determined by the history of user navigation choices. The paper analyzes the work to reveal critical insights into database narrative, expressive interface design, user agency, and the construction of micronarrative.

Certain contemporary filmmakers engage in cinematic constructions that complicate the experience of film and the pleasure of story. One common form of complication is the design of narrative that relies on the presentation of complex plot structures. A second form is visual – the fragmentation of the frame into multiple split-screen windows and the channeling of story across these multiple windows. The audience's pleasure in both these forms of cinematic complication is enhanced by contemporary technology. Large screens and high-definition video standards support the display of more complicated visual storytelling. DVD players free viewers to review and replay the film text many times in order to fully appreciate complexities of the narrative or the visuals. As a next step, these two directions – plot complexity and multi-window storytelling – can be integrated within fully interactive cinematic systems that make explicit viewer choice a central component of the design and the experience. The film *Lost Cause*[1] does exactly that – offering user choice for the navigation between separate visual windows and between distinct but intimately interrelated narrative threads.

Alternative Narratives

Some directors and screenwriters choose to design alternative plot structures that make it more challenging, and more interesting, for viewers to decode the story. Charles Ramirez Berg categorizes films that complicate the standard Hollywood narrative paradigm into a taxonomy of alternative plot structures.[2] Berg characterizes the polyphonic "ensemble plot" formation as a plot that joins multiple protagonists within one narrative web to emphasize an overall theme. He also identifies a "repeated event" plot formation, which has some characteristics of an ensemble plot, but reveals each character's storyline sequentially. This type of plot construction can help the viewer compare and interpret all perspectives of the same incident by emphasizing and repeating key plot points. Berg suggests that the film *Jackie Brown*[3] has "three views of the same action to clarify an important plot point."[4] This type of plot formation can be used to reveal different characters' interpretations of the same event. The film *Rashomon*[5] "establishes the Repeated Event Plot, using it to argue that since events are interpreted subjectively, truth is elusive."[6]

Micronarratives

Henry Jenkins defines a micronarrative as a short yet coherent narrative unit.[7] Jenkins claims the Odessa Steps sequence in Sergei Eisenstein's montage film *The Battleship Potemkin* is constructed of many micronarratives. He states "Eisenstein intensifies our emotional engagement with this large-scale conflict through a series of short narrative units. Each of these units builds upon stock characters or situations drawn from the repertoire of melodrama."[8]

The film *Short Cuts*[9] is an exemplar for micronarrative construction. The film has twenty-two main characters and nine constantly interweaving storylines. Balcom suggests the association in *Short Cuts* between characters and micronarratives creates richness in the narrative through its linking of themes.[10] Betty comes out of the shower to find the television left on. As she turns it off and turns around, she is startled to find her son left behind by his father. A similar event occurs with Ann, when she returns home to find the television is on and after turning it off, is surprised to find her son lying on the couch, after being hit by a car. Balcom states, "this sequence establishes a thematic relationship between the two little boys whose situations are different, but resonate all the same. Here a major theme of *Short Cuts* is revealed: The 'What if…?' decisions that are made every day, the decisions that have put the characters in *Short Cuts* together…" He compares the viewers experience with *Short Cuts* to be similar to interacting with Michael Joyce's hypertext narrative *Afternoon.*[11] "The text the viewer had visited was exactly the same, but the con-

1 *Lost Cause*, Desktop Media, directed and produced by Kirsten Johnson. (Canada, 2007).
2 Charles Ramirez Berg, "A Taxonomy of Alternative Plots in Recent Films: Classifying the "Tarantino Effect"." *Film Criticism* (2006-2007): 31-1:2.
3 *Jackie Brown*, DVD, directed by Quentin Tarantino (USA: Miramax Films, 1997).
4 Berg, Film Criticism, 31-1:2.
5 *Rashomon*, DVD, directed by Akira Kurosawa (Japan: Daiei Motion Picture Company, 1950).
6 Berg, *Film Criticism*, 31-1:2.
7 Henry Jenkins, "Game Design as Narrative Architecture," in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan, (Cambridge, Massachusetts: The MIT Press, 2004). 125.
8 Ibid., 125.
9 *Short Cuts*, DVD, directed by Robert Altman. (USA: Avenue Pictures Productions, 1993).
10 David Balcom, "*Short Cuts*, Narrative Film and Hypertext" http://www.mindspring.com/~dbalcom/short_cuts.html, 1996. (accessed October 15, 2007).
11 Michael Joyce, *Afternoon, a story*. Hypertext fiction. (Cambridge, MA: The Eastgate Press, 1990).

text surrounded them had changed. This experience is similar to Pudovkin's experiment with the Kuleshov effect."[12]

Database Narratives

Manovich claims that narratives and databases are opposites, but he also recognizes that some films can be regarded as both a database and a narrative.[13] Bizzocchi suggests that *Run Lola Run*[14] is such a database narrative film.[15] Lola's three separate runs across the city of Berlin string together narrative events that are rigorously parallel. Viewers are therefore highly motivated to compare parallel events across the three threads of the plot. This is a sophisticated example of Eric Zimmerman's first level of interactivity – cognitive interaction with the text.[16] Bizzocchi argues that modern technology such as VHS, DVD, or computer file versions of the film support this cognitive interaction with interface functionality.[17] During repeated viewing, the viewer can rewind, fast-forward, or jump across plot threads in order to more fully understand the film's parallel plot threads. This is an example of Zimmerman's level two interactivity – functional interaction with a media artifact. Bizzocchi further argues that the combination of complex plots and sophisticated technologies not only support robust first and second level interactions, but is also a partial step towards the design of an interactive cinema that instantiates Zimmerman's third level of interactivity – explicitly designed choice.[18]

Cinematic Techniques and Narrative Effects

Continuity, cross-cutting, and montage editing are standard techniques used to produce narrative in film. Continuity editing joins separate shots so they appear to happen in the same space at the same time and sequence. Crosscutting is used to show parallel action happening between two scenes in different spaces at the same time. This technique can build suspense in the narrative by cutting back and forth between two locations to anticipate future events. Montage editing constructs meaning through the juxtaposition of different shots. Eisenstein maintains that a film viewer combines these juxtaposed individual shots to form higher order connections and threads.[19]

Split-screen effects

The use of split screens can be seen as a spatial variation of temporal montage. Viewers cognitively interact to choose which window to observe throughout their viewing of a split-screen film. *Time Code*[20] uses split screen effects as an important visual structure to emphasize the connections between time, space, and characters. Figgis uses sound in *Time Code* to focus viewers' attention to particular screens and narrative elements. However other variables such as size of screen windows, lighting, motion, or intensity of action can attract viewer attention to one split-screen window over others. In interactive works, the split screen can be integrated into the design of the interface.

Interactive Cinema Interface

A central challenge in interactive cinema is the design of an interface that can maintain viewer immersion within the experience while the viewer actively makes choices. Murray describes immersion as transporting a viewer to another place.[21] In cinema viewers can feel immersed if they are in a state of suspension of disbelief and are lost within the viewing experience. Bolter and Grusin describe this phenomenon as immediacy, where the medium and the interface become invisible to the viewer.[22]

12 The "Kuleshov Effect" refers to a famous experiment from early cinema. The audience was shown identical close-ups of an actor's face, juxtaposed with shots of a happy baby, a bowl of soup, and a dead woman. The audience interpreted that his (actually expressionless) face showed deep and appropriate emotional responses to each of the three shots with which it was juxtaposed.

13 Lev Manovich, *The Language of New Media* (Cambridge, Massachusetts: The MIT Press, 2001), 225.

14 *Run Lola Run*, DVD, directed by Tom Tykwer (Germany: X-Filme Creative Pool, 1999).

15 Jim Bizzocchi, "*Run, Lola, Run*: Film as a Narrative Database." (paper presented at MIT4: The Work of Stories, Cambridge, Massachusetts: May 6-8, 2005). http://web.mit.edu/comm-forum/mit4/papers/bizzocchi.pdf (accessed March 28, 2008), 4.

16 Eric Zimmerman, "Narrative, Interactivity, Play, and Games: Four Naughty Concepts in Need of Discipline," in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, Massachusetts: The MIT Press, 2004), 158.

17 Bizzocchi, "Run, Lola, Run"

18 Zimmerman, "Narrative, Interactivity, Play, and Games," 158.

19 Sergei Eisenstein, *Film Form: Essays in Film Theory* (New York: Harcourt Brace and Company, 1949), 29-30

20 *Time Code*, DVD, directed by Mike Figgis (USA: Red Mullet Productions, 2000).

21 Janet Murray, *Hamlet on the Holodeck* (New York: The Free Press, 1997). 98.

22 David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, Massachusetts: The MIT Press, 2000), 21-31.

Murray defines agency as the satisfying power to take meaningful action and see the results of choices.[23] When the viewer has a strong sense of agency while interacting with a medium, it is more likely that the viewer will feel immersed within the experience. When a viewer is aware of the interface Bolter and Grusin describe, this as a hypermediated experience. Bolter and Grusin maintain that during a well-designed mediated experience, viewers can oscillate between a state of immediacy and a state of hypermediacy.[24]

The Interface of *Lost Cause*

The interactive film *Lost Cause* requires viewers to navigate with a computer mouse. The interface of *Lost Cause* has one large screen in the center to display the main video and three thumbnail screens which function as interactive buttons (see Figure 1 Interface of *Lost Cause*).

Figure 1 Interface of *Lost Cause*

Each of the thumbnail screens represents one of the three characters' perspectives or storylines. When the cursor is rolled over a thumbnail screen, the video from that small screen will be mirrored onto the large screen. The three small screens play simultaneously and a viewer can select any one (but only one) of the three storylines at any time. Time can be paused or played but not retraced for the duration of the film. Neither the main screen nor the thumbnails can be rewound or played in reverse. The interface functionality is similar to a picture-in-picture method of channel surfing on a television, which allows viewers to see multiple channels at the same time and flip back and forth between these channels at any time.

23 Murray, *Hamlet on the Holodeck* 126.
24 Bolter and Grusin, *Remediation: Understanding New Media*. 41.

Narrative Perspectives in *Lost Cause*

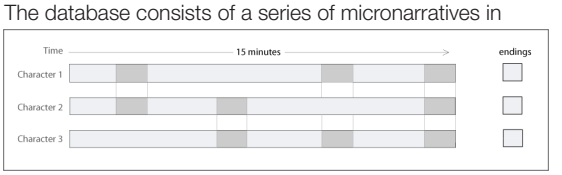
The story in *Lost Cause* takes place in an apartment complex and focuses around three characters and their relationship with Chloe, the young woman who links the three other characters. Colin is Chloe's husband. The couple lives on the second floor. He tries to fix their rocky relationship and spends a majority of his time in the film searching for her. Arie is Chloe's lover. He works as a maintenance worker at the apartment complex and is convinced that Chloe should leave her husband for him. Tina is Chloe's elderly mother. She lives on the third floor and questions why her daughter has grown distant from her. Although the viewers never see the story from Chloe's perspective, the three stories together suggest what Chloe's story might be.

Lost Cause as Narrative Database

Lost Cause is structured as a narrative database of the three characters in space and time (see Figure 2 Narrative Database Structure of *Lost Cause*). The dark grey areas represent the time that two characters intersect in the same location. Each character has its own ending.

Figure 2 Narrative Database Structure of *Lost Cause*

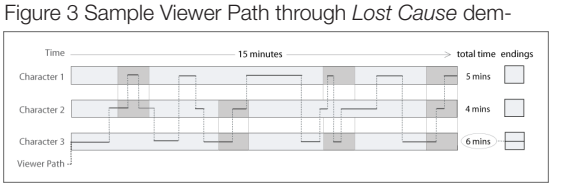
The database consists of a series of micronarratives in



the timeline for each character. The plot is structured dynamically, depending on the events chosen by the viewer.

Figure 3 Sample Viewer Path through *Lost Cause*

Figure 3 Sample Viewer Path through *Lost Cause* dem-



onstrates one path a viewer might take while navigating between the three characters' perspectives. At the end, one of three possible conclusions will be played, depending on which thread has been selected most often by the viewer.

Experience of the Interface in *Lost Cause*

The interface provides viewers with random access across the database narrative as the film plays. This can generate an immersive experience as they discover narrative information and narrative relationships connecting the three thumbnail screens. Immersion is generated in the interface through a combination of hypermediation and agency. The viewer constantly oscillates between states of engaging hypermediation (instant navigation to the desired story thread) and immediacy (the pleasure of narrative).[25]

Agency is manifest at these moments of viewer choice; however agency is limited by the work's temporal structure. Since rewinding is not possible, choice is irrevocable. This temporal constraint generates motivation for viewers to make wiser choices in selecting narrative sequences. This restriction in the kind and number of decisions the viewer can make leaves them freer to enjoy the experience of the story as it unfolds.

However, this experience is complicated by the content. Specific split screen events can attract a viewer's attention and motivate them to interact. For example a screen with a lot of action, detail in the composition, or a conversation between two people would attract a viewer's attention. When combinations of these contents are displayed at the same time on multiple screens, viewers are forced to decide which screen is more important. At one point in *Lost Cause* there is a close up of a letter being written by Tina on one screen and on the other screens there is a lot of action. The viewer is left to decide if they prefer to read detail or follow action.

Interactive Design in *Lost Cause*

The ease of selection supports oscillation, allowing the viewer to seamlessly switch between threads and experience the unfolding story. The database and the interface are designed for viewers to discover narrative connections and narrative themes. However, as viewers navigate the database narrative and the film continues to play forward, they will indeed miss some information. This will lead viewers to subjectively interpret the events by connecting the scenes they did see. Viewers develop a goal in their navigation: to figure out the causality in the story between the three characters. Exploration becomes more pleasurable as viewers discover character connections and begin to piece together relationships, histories, and chains of causality.

The scenes a viewer chooses create subjective content to be interpreted by the viewers. For example, a fight occurs between Colin and Arie. This sequence has similarities and differences across the two perspectives. In Colin's perspective (see Figure 4 Colin's Perspective), Colin is surprised to find Chloe cutting her wrist with a knife and he struggles with her to drop the knife. He is suddenly attacked from behind by Arie. In Arie's perspective (see Figure 5 Arie's Perspective), Arie falls into the room from the balcony and discovers Colin slapping Chloe. In this version Colin attacks Arie.

Figure 4 Colin's Perspective

Figure 5 Arie's Perspective

In the two perspectives the fight starts off differently, but becomes parallel in both perspectives once Colin elbows

25 Manovich, *The Language of New Media.* 210.

Arie in the stomach. Whichever perspective the viewer privileges will sway the perception of the events and judgment about the characters. Perception of the narrative events is therefore subjective. Any resultant viewer construction of narrative will reflect the cumulative combination of different elements selected from the three perspectives.

Multiple storylines occur in *Lost Cause*, creating a dense weave the viewer can try to solve. Chloe's plot can be constructed by piecing together the scenes in which she is present. Viewing all possible storylines in the film will develop a deeper understanding of the story. In Arie's perspective, Chloe can be seen entering the elevator on the third floor. Minutes later, in Colin's perspective, a viewer can observe his argument with Chloe in the staircase as she carries a laundry basket. Seconds later, Chloe is seen in Tina's perspective as she drops off a laundry basket. The conclusion is that Chloe took the elevator to the laundry room, then the stairs to drop the laundry basket to her mother's apartment.

Cinematic Technique and Narrative Effect in *Lost Cause*

By navigating between the thumbnail screens, the viewer creates her own edit of the film on the larger screen. The viewer can use a cross-cutting technique to actively cut back and forth between the parallel stories in real time. This effect can reveal spatial relationships between the two smaller screens and build suspense. At one point, Colin chases Arie into the storage room. The viewer can navigate back and forth between the two characters' parallel perspectives and build tension for the events to come.

Further, as viewers navigate between sequences an unanticipated montage effect can occur when two sequences are juxtaposed on the larger screen and together create a narrative theme. For example, at the beginning of *Lost Cause* there is a sequence in Colin's thread where he pulls out a gun. If this sequence is juxtaposed with a shot of Arie, subjective meaning can be created suggesting Colin's urge to kill Arie. If however, Colin's sequence is juxtaposed with a sequence of Tina, it foreshadows the films ultimate conclusion.

Micronarrative Textures within the Broader Narrative

The overall narrative structure has been enriched through the inclusion of micronarratives. Some micronarratives occur in the course of each character's main thread, and others are glimpsed in passing in the background. Like individual shots, micronarratives can be connected through the montage effect and thus can support broader narrative themes. This is similar to what Balcom describes in *Short Cuts*, where narrative themes are built through the combination of events from different characters.[26]

As Colin wanders around the apartment complex in search of Chloe, ancillary characters form micronarratives in the background of his path. Colin enters the lobby and a man is saying: "She never calls me. I think I lost her. What can I do?." A few seconds later Colin walks in the courtyard and overhears a man on the phone asking for directions and he also sees another man who lost his change to the vending machine. These sequences in combination support a shared narrative theme of loss. Similar micronarratives drawn from other combinations can support a variety of themes. Arie also encounters a Spanish couple in the elevator. The man says, "You must know, you're a woman. I always ask and you always tell me, I don't know." This chance fragment is reflected in Arie's own thread when he argues with Chloe in the staircase. He asks what has happened between Chloe and her husband she suggests that she doesn't know, "Nothing. We can't see each other anymore." Like the Spanish couple, Chloe finds emptiness in her own relationships.

The Pleasures of Repeated Viewing

For a short film, *Lost Cause* is a complicated mixture of four main characters, three separate viewing perspectives, and a number of primary and subsidiary actions – all to be understood within the context of a single larger narrative web. Initial viewing will tease out a sense of character and an understanding of action. However, multiple screenings can reveal even deeper pleasures. Repeated viewing of the work supports a *Rashômon*-like effect of cumulative discovery of each character's unique perspective and their relation to each other and to the whole. Although the parallel threads have many similarities, the viewer will detect subtle differences in actions or conversations. The multiple perspectives define character traits and relationships. Similarities across threads can be interpreted by the viewer as an indication of what really happened. Differences across threads can be interpreted as specific character perceptions. The combination yields a deeper understanding of the entire narrative constellation.

26 David Balcom, "*Short Cuts*, Narrative Film and Hypertext."

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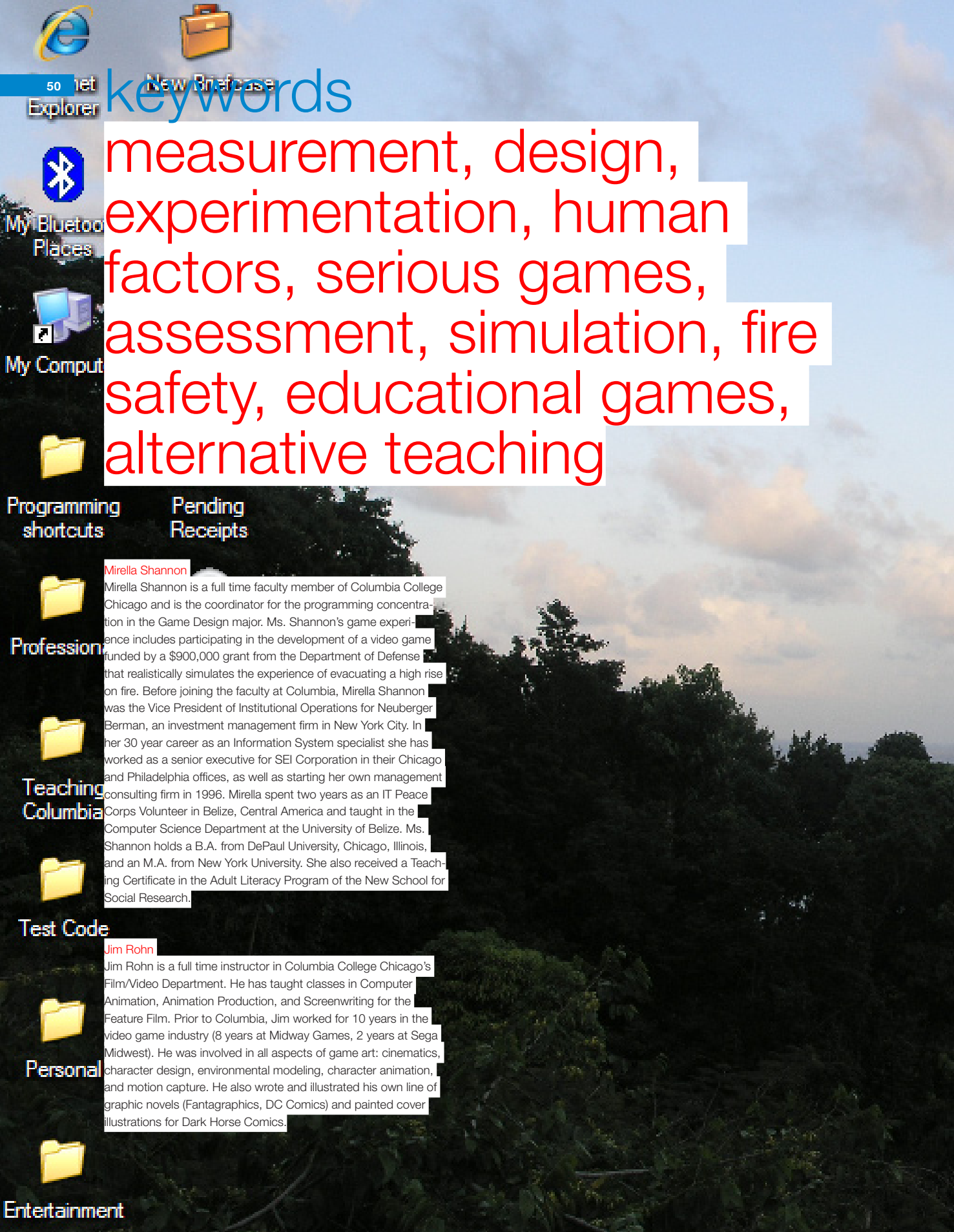
keywords

measurement, design, experimentation, human factors, serious games, assessment, simulation, fire safety, educational games, alternative teaching



Mirella Shannon

Mirella Shannon is a full time faculty member of Columbia College Chicago and is the coordinator for the programming concentration in the Game Design major. Ms. Shannon's game experience includes participating in the development of a video game funded by a $900,000 grant from the Department of Defense that realistically simulates the experience of evacuating a high rise on fire. Before joining the faculty at Columbia, Mirella Shannon was the Vice President of Institutional Operations for Neuberger Berman, an investment management firm in New York City. In her 30 year career as an Information System specialist she has worked as a senior executive for SEI Corporation in their Chicago and Philadelphia offices, as well as starting her own management consulting firm in 1996. Mirella spent two years as an IT Peace Corps Volunteer in Belize, Central America and taught in the Computer Science Department at the University of Belize. Ms. Shannon holds a B.A. from DePaul University, Chicago, Illinois, and an M.A. from New York University. She also received a Teaching Certificate in the Adult Literacy Program of the New School for Social Research.

Jim Rohn

Jim Rohn is a full time instructor in Columbia College Chicago's Film/Video Department. He has taught classes in Computer Animation, Animation Production, and Screenwriting for the Feature Film. Prior to Columbia, Jim worked for 10 years in the video game industry (8 years at Midway Games, 2 years at Sega Midwest). He was involved in all aspects of game art: cinematics, character design, environmental modeling, character animation, and motion capture. He also wrote and illustrated his own line of graphic novels (Fantagraphics, DC Comics) and painted cover illustrations for Dark Horse Comics.

From Unreal Tournament to High Rise Evacuation: Using Game Engines as a Serious Game Development Tool.

Mirella Shannon
Columbia College Chicago

Jim Rohn
Columbia College Chicago

Columbia College's School of Media Art, in response to the need for a new model of disaster preparedness training for the general public, developed an interactive simulation and game that realistically simulates the experience of a high rise fire. Due to the population density in the high rises of Chicago and several tragic fires, a more effective training method for building occupants was needed. By using the tools of video game production, the resulting project actively involves the participant with more complex material than could be staged during a drill, resulting in better retention and learning outcomes.

Assessment of the effectiveness of the video game was a critical component of the project and as a result a detailed game assessment process was developed. The assessment results of the player can be analyzed at the end of each game, and the cumulative results of all players are stored on a relational database. Because of the importance of validating that actual learning outcomes have been achieved for such a life threatening situation, the Chicago Fire Department is considering adopting the game as one of its methods of teaching fire safety.

Introduction

Games are not just about entertainment.[1] Games that go beyond merely entertainment are referred to as "serious games" and are used for interactive education, communication, and art. The idea of serious games was developed in 2002 by game developers when they realized that the simulations and environments created in their games could be applied to problems in the real world.[2] Corporations, government agencies, and educational institutions are using the commercially available software used to create video games as a new way of developing simulations and training applications. This has resulted in a demand for applications that deal with "serious" purposes other then entertainment.[3] There is now a growing market for game developers who produce products for both economic and social benefit.[4] Games for Change (G4C) is an initiative that uses games to advance organizational mission and societal changes. Some of their recent projects include working with Microsoft in the Xbox 360 Challenge, a worldwide competition for college students to develop the best game based on the theme of global warming. G4C is also part of the PETLab project that will work with teens to develop a social issue web-based game.

Columbia College has recently completed development of the game High rise Evacuation Learning Platform (H.E.L.P.). H.E.L.P. is a game that uses the core software components and real time graphics capabilities of the Unreal game engine to realistically simulate a fire in a high rise. The goal is to successfully exit a building when faced with different real-life situations. Through simulation the player learns the appropriate responses to each life threatening situation. (See Figure 1.)

Figure 1

H.E.L.P. was developed using the Unreal Game Engine and because of the richness of the 3D elements and virtual world capabilities available, (See Figure 2). The resulting game has the appearance and game play elements found in the most popular video games. This helped bridge the gap between entertainment and the effectiveness of serious games. None of the learning outcomes of the game had to be sacrificed to give it the playability demanded by the current video gaming community. Playability can be measured by evaluating the game play, game story, game

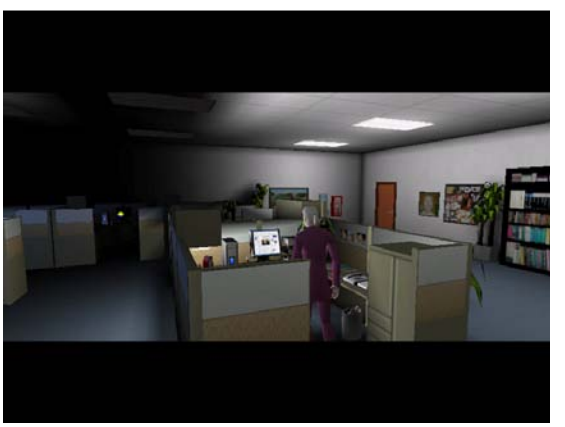


Figure 2

1 S. Glazer, "Video Games: Do they have educational value?" *CQ Researcher* 16 40 (2006): 937-960.
2 D. Rejeski, "Serious Game Initiative." (2002) http://www.seriousgames.org/about2.html.(Accessed September 14, 2007).
3 R. Naish, "Why games are so serious," *E.learning Age* (April, 2005).
4 D. Michael, The Serious Side of Having Fun. *Serious Game Summit*. Washington, D.C. (2004).

mechanics, and game usability. Each component contributes to the player's overall positive experience by increasing the player's enjoyment, immersion, or challenges of the game.[5]

H.E.L.P., as an educational tool that can be used to teach high rise occupants what to do in case of fire, has an assessment component that measures the efficacy of the game as a learning method, in contrast to more traditional methods such as video and written instructions.[6] The learning outcomes of the H.E.L.P. game were defined by the Chicago Fire Department based on the C.A.L.M. model of fire response: Call 911 if you see or smell smoke, Alert authorities, Listen to authorities and follow instructions, and Move safely and quickly exit the building. The five learning objectives of H.E.L.P are: 1) participants will understand the four steps of the C.A.L.M. model of fire response; 2) they will be able to identify a safe exit route; 3) develop basic escape strategies; 4) know who to alert in case of a fire, and 5) know if they are designated to help others to safety.

H.E.L.P. uses four narrative scenarios to review and reinforce the learning goals identified in the Chicago Fire Department's C.A.L.M video, one of the teaching tools used by the Chicago Fire Department in addition to fire drills and safety lectures. (See Figure 5 Scenarios)

Scenario 1: It's late at night and the player is alone working in his cubicle on an important project that is due tomorrow. He smells smoke and then discovers smoke and fire coming from under the door of a locked closet. The door is very hot to the touch.

Scenario 2: It's a normal workday morning. The player is in his office when the fire alarm sounds. Moments later a co-worker, who is the floor's designated Fire Marshal, opens the player's door and instructs the player to follow him to the stairwell.

Scenario 3: It's Saturday afternoon and the player is alone working in his cubicle on an important project that is due on Monday. He smells smoke. The player is unable to figure out where the smoke is coming from.

5 D. Heather, C. Martin, et al. Using heuristics to evaluate the playability of games. *CHI '04 extended abstracts on Human factors in computing systems*. Vienna, Austria, ACM. (2004)

6 M. Prensky, *"Don't bother me Mom, I'm learning!" : how computer and video games are preparing your kids for twenty-first century success and how you can help!* (St. Paul, Minn., Paragon House. 2006).

The effectiveness of the game to train office personnel on safe building evacuation was a primary goal and the game play and feedback had to be constructed to achieve the learning objectives.

Figure 4

Figure 3

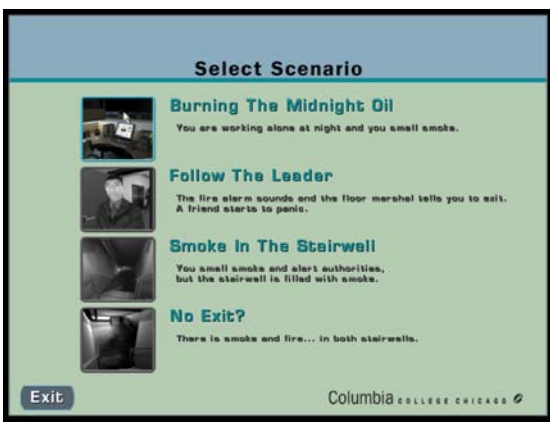


Figure 5

Scenario 4: It's Saturday afternoon and the player is alone working in his cubicle on an important project that is due on Monday. He smells smoke. The player is unable to figure out where the smoke is coming from and both exits are blocked.

THE H.E.L.P WORLD takes place in a typical high rise office building. The player is working on the 6th floor of a 20 story building. The player's workspace is a cubicle equipped with a phone with a direct line to building security. The player is able to place phone calls, open and close doors, approach fellow coworkers, grab objects to seal doors, walk around the office floor, and run down the stairwells. There are many objects throughout the building that the player can interact with to enable him to safely exit the building. These include the office phone, doors, and the coat rack. (See Figure 3.)

Characters were modeled in 3D using Autodesk's Maya 3D animation software.[7] Reference photos of Chicago firefighters and models were used for texture mapping. (See Figure 4.) Environments were either modeled specifically for the game or purchased online. Models were exported to the Unreal Engine as game assets for the programming team. Animation was created by Chicago firefighters and actors specializing in motion capture performance using Motion Analysis.[8] The motion capture data was assigned to the character models using Autodesk's Motion Builder and Maya's 3D animation software. Animation files were exported to the Unreal Engine as game assets for the programming team. The game was developed using the Unreal 2 game engine licensed through Epic Games.[9]

7 Maya is a 3D modeling and animation software program used in feature films and games including *King Kong* (Weta Digital), *Transformers* (Industrial Light & Magic), *Stranglehold* (Midway Games), *The DaVinci Code* (Double Negative) and *Surf's Up* (Sony Picture Imageworks).

8 Motion Analysis provides optical motion-capture systems in entertainment, video games, and film. Recent film projects include *King Kong*, *Lord of the Rings: The Return of the King* (Weta Digital), *Stranglehold*" (Midway Games), and *I, Robot* (Digital Domain).

9 Epic Games Inc was founded in 1991 and is a leading independent developer of 3D games and core technology. Unreal Engine 2 is a complete game development framework. Epic's Unreal Engine has powered over 50 titles selling a cumulative total of over 16 million copies, including Splinter Cell and Rainbow Six 3 (Ubi Soft); Deus Ex and Thief 3 (Eidos); Lineage II (NCSoft); Harry Potter and Ultima X (Electronic Arts); and America's Army (US Department of Defense). Unreal Engine powered games have shipped on Xbox, PlayStation2, GameCube, DreamCast, Windows, Linux, and MacOS X.

There are two original music scores that are used repeatedly throughout the game. The first entitled VictoryMusic is heard when the player has successfully completed one of the four scenarios. The second entitled DeathMusic is heard when a player fails to complete one of the four scenarios correctly.

Voice dialogues are used throughout the game to provide instruction or to enhance the reality of the experience. Examples of the dialogues are: A male player calling 911; a female player redialing 911 when trapped in office; a panicked coworker and the 911 operator.

In order to create realistic ambient sounds during game play sound effects will be heard depending on the location and game state of the player. Examples include: fire engines, foot steps, phone dialing, fire alarm, street sounds.

The game play is as follows. The user plays a Columbia College employee who works on the sixth floor of a 20 story office building at 623 S. Wabash Ave. The character does not have a cell phone, and the building has no external fire escapes. While working, the character is caught in four different high rise fire scenarios and must react in a certain way to safely and successfully escape the building. If the player does not follow the correct procedures, the attempt at escaping fails and the scenario must be repeated. In order to win the game, the player must successfully complete the following steps in the sequence appropriate to the scenario (see Appendix A Victory Conditions). A number of conditions will result in the player losing the game. In any Scenarios, players will lose if they fail to follow the correct sequence of events or attempt to exit on any floor other than ground floor. In Scenario 2, players will lose if they approach the panicking office worker and

	Control Group	Game Only	Game and Video
Correct Responses			
Total Respondents	82	16	6
You are working at your desk on a weekend and you see smoke	22.0%	93.8%	83.3%
The minimum number of stairwell exits in a high rise is:	70.7%	87.5%	83.3%
You have been asked to exit the building by your fire marshal but a coworker is visibly upset and unable to move	20.7%	68.8%	100.0%
After dialing 911	30.5%	93.8%	83.3%
While attempting to exit the building through a stairwell you see smoke in the stairwell	92.7%	93.8%	83.3%
All exits from your floor are smoke filled	59.8%	87.5%	83.3%
All exits are blocked and smoke is filling your office after sealing the door	39.0%	50.0%	83.3%
Your primary exit is blocked and the alternate exit door feels warm	40.2%	81.3%	100.0%
If you are trapped in your office	78.0%	93.8%	83.3%
While exiting your office	78.0%	81.3%	83.3%
You've been instructed by the fire marshal to stay on your floor but you see fire on your floor	36.6%	0.0%	16.7%

Table 1 Summary of Assessment Results

attempt to assist the fire marshal. In Scenario 4, a player will lose if they open the alternative stairwell door when the hand control shows that the door is warm or hot or if they fail to seal the door.

The effectiveness of the game to train office personnel on safe building evacuation was a primary goal and the game play and feedback had to be constructed to achieve the learning objectives. In order to gauge how well the game met the educational goals a detailed game assessment process was developed.

The efficacy of the game as a learning method was evaluated using a questionnaire that was given to four groups.

Group 1: Control group of individuals who have had no previous training in high rise building evacuation.

Group 2: Individuals who have viewed the C.A.L.M. video

Group 3: Individuals who have played H.E.L.P.

Group 4: Individuals who have viewed the C.A.L.M. video and played H.E.L.P.

Each group, with the exception of the control group, was given a questionnaire after viewing the C.A.L.M video, playing H.E.L.P., or both. The questionnaire was divided into two sections. One section comprised of 6 questions was used to gather the background of the participants in the study, while the other section comprised of 11 questions measured their building evacuation knowledge. A comparison of results was used to ascertain how well each group performed in regard to the learning outcomes of H.E.L.P.

The control group survey was sent via email to all faculty and staff of Columbia College Chicago who were invited to participate in the study. Of approximately 900 invitees a total of 87 responded.

The final three groups were given packets containing the game CD, install instructions, and a link to one of the three surveys. They were randomly given packets that would place them into one of the three control groups. In order to participate in the study the volunteers were asked to sign a roster indicating they had received the CD and would be expected to return the packet after completing the study. They were also asked for any feedback they would like to share with the developers about the experience.Table 1 Summary of Assessment Results

Conclusions

The results of our study show that there was an increase of correct answers to survey questions as a result of playing the game. Because of time constraints, we were unable to gather larger populations within each assessment group. However, even with our sample size, our results indicate that playing the game clearly met the learning objectives of our project. More time and participants, we believe, would strengthen our findings.

Comments from participants provided us with additional information on how to improve the game and make it more playable by a larger demographic. This project has provided significant insight on how serious games should be constructed and how to create methods of assessing their effectiveness. We hope to apply what we have learned to future projects as well as continue our research of video games as an important and better way of learning.

Acknowledgements

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Appendix A Victory Conditions

Scenario 1

Dial 911

Press the building security button on phone

Navigate to the primary exit stairwell

Walk down each flight of stairs

Use the exit door on the ground floor

Exit the building through the ground floor main doors

Scenario 2

Walk down each flight of stairs

Use exit door on ground floor

Exit the building through ground floor main doors

Scenario 3

Dial 911

Press the building security button on the phone

Navigate to the primary exit stairwell
Walk down each flight of stairs until smoke is seen
Walk back up the stairs and return to original floor location
Navigate to the alternate exit stairwell
Use the exit door on the ground floor
Exit the building through ground floor back door

Scenario 4

Dial 911
Press the building security button on phone
Navigate to the primary exit stairwell
Walk down each flight of stairs until smoke is seen
Walk back up the stairs and return to the original floor location
Navigate to the alternate exit stairwell
Approach the door until the hand control shows that the door is warm/hot
Return to the original office location
Dial 911
Navigate to the coat rack
Grab a coat
Seal the office door using the coat
Navigate toward a window and signal location to firefighters

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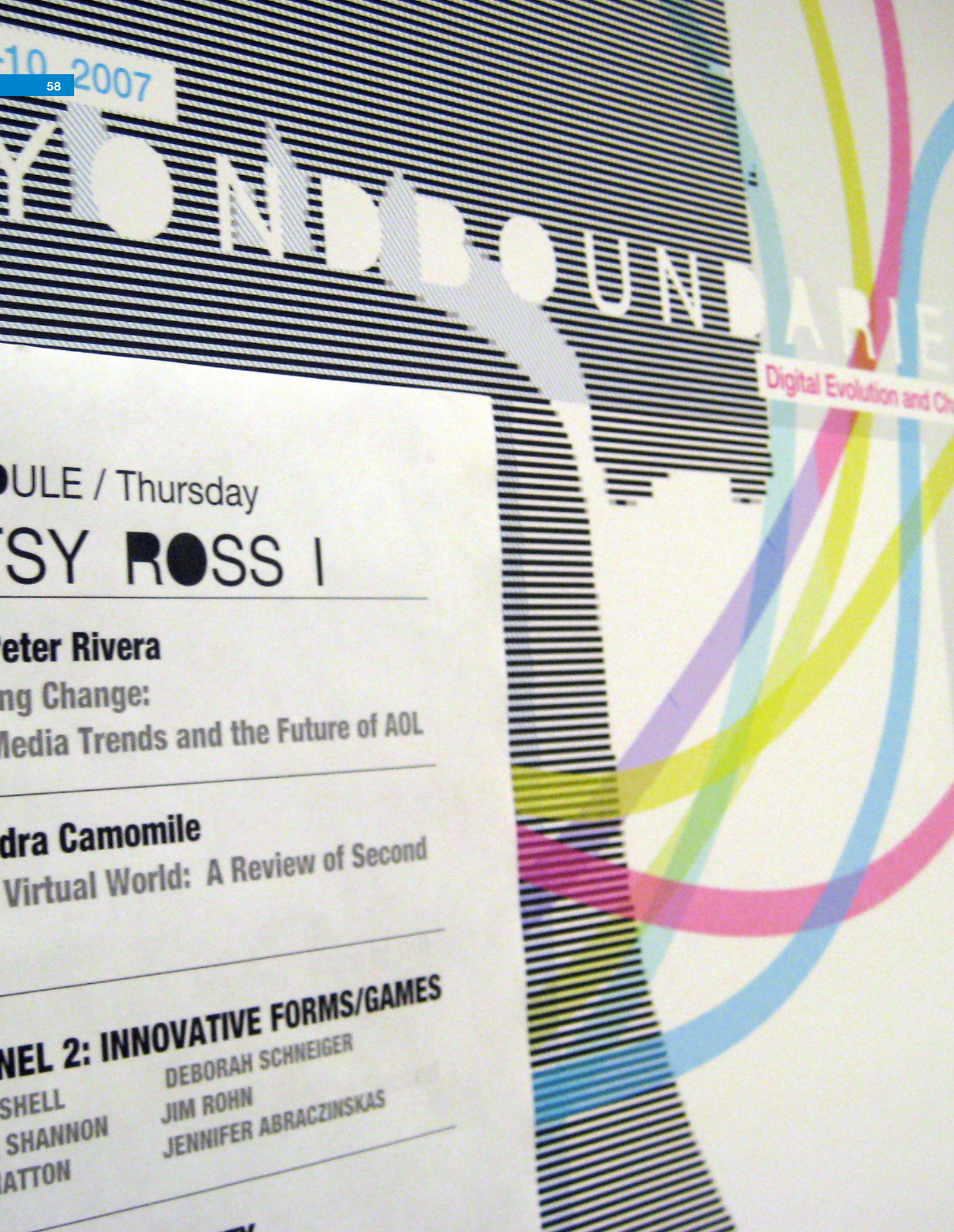
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