

Hacking Public Memory: Understanding the Multiple Arcade Machine Emulator

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Abstract

This article uses a case study of the multiple arcade machine emulator (MAME) to insist that emulation is an important aspect of digital game culture that should not be dismissed due to copyright concerns. The author argues that emulators should be understood as ludic technologies produced by hacking practices that helped spawn and continue to permeate video game culture. Furthermore, while it may be tempting to describe the MAME as a “counter archive” that challenges institutional models of preservation, by drawing on the work of Coleman the author insists the project is better understood as a hacking practice committed to reordering “technologies and infrastructures” (p. 515). From this perspective, instead of rejecting institutional archival perspectives that view documents as truth-telling entities, the project hacks the traditional notion of the archive by treating platforms as contingent entities and game code as authentic artifacts.

Keywords

arcade games, history, emulation, archive theory, hacking, platforms

While a body of literature dealing with the preservation of digital games has begun to emerge, the cultural significance of online emulation practices, where programs

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are designed to mimic platforms that classic games run on, is often downplayed due to complicated legal issues pertaining to copyright. In “Playing Games With Cultural Heritage: A Comparative Case Study Analysis of the Current Status of Digital Game Preservation,” Barwick, Dearnley, and Muir (2011) summarize the dominant institutional thinking by concluding that due to the possibility of copyright infringement fan-based emulation practices “are not a stable preservation solution” and “cannot be viewed as a legitimate research resource” (p. 376). Digital rights management is creating major hurdles for video game preservation, but to downplay fan-based emulation practices due to the possibility of copyright infringement ignores an important aspect of digital game culture that corresponds to broader shifts in digital culture. Furthermore, while Lowood (2004), Swalwell (2009), and McDonough et al. (2010) provide some positive consideration of emulation as a preservation practice, this research has not investigated the cultural significance of fan-based projects. From this perspective, by taking a closer look at one of the most successful online emulation projects to date, the multiple arcade machine emulator (commonly referred to as the MAME), this article will demonstrate how emulators are ludic technologies (Consalvo, 2007) that should be understood as an extension of “hacking” practices that helped spawn and continue to permeate digital game culture. Instead of challenging institutional archives, the MAME hacks them by treating platforms as contingent entities and defining game code as authentic artifacts that speak truth.

What is Emulation?

In *Digital Archaeology: Rescuing Neglected and Damaged Data Resources*, Gow and Ross (1999) provide a useful explanation of the emulation process: A very subtle distinction can be drawn between a simulation and an emulation. Simulations recreate the entire environment of the hardware and software; it may often involve creating a new application [. . .]. Emulations focus on either recreating the internal design of the system (whether hardware, software, or both) or on creating an environment in the case of software in which the original software can be run. A game, for example Pacman, written to run on a PC and providing the look and feel of the arcade game itself is a simulation. An emulation on the other hand would provide a suitable environment in which to run the original Pacman software” (p. 29).

From this perspective, the MAME uses the emulation process to create software applications that run arcade game code. In order to perform this function, the MAME works by tricking the game code in believing that it is running on the original arcade cabinet fundamentally changing the context of game play. In order to expand on this point, it is important to call attention to specific characteristics of arcade game play stemming from the relationship between cabinets and code.

When considering the literature dealing with arcade culture, it is important to acknowledge how the social context of the arcade is often described as having an important impact on game play. Arcades are places where video games are

consumed in a highly social physically exhibitively manner where play is not confined to the boundaries of the screen. Within this context, a drawback to using emulation as a preservation solution stems from the fact that arcade cabinets are an important element contributing to game play. In *Abstraction in the Video Game*, M. J. P Wolf (2003) describes how technical limitations required early game programmers to rely on abstract graphics creating a situation where many popular games, like Pac Man and Q*bert, “personify their characters though cabinet art” (p. 60). In addition, Juul (2009) has used the term *mimetic interface games* to describe early arcade titles alongside the recently successful *Guitar Hero* franchise to emphasize how games utilizing special controllers designed to mimic specific movements (like playing a guitar or following a dance routine) create an experience “where players are often themselves a spectacle” (p. 20). From this perspective, the MAME cannot reproduce the physical cabinets and the social context that were an important aspect of the early video game experience. An emulated game is zombie code running without knowledge of its platforms death.

Furthermore, while the social context of arcades clearly impacted early gaming, the economic reasoning imbedded within arcade cabinets had a considerable influence on early game design. In contrast to games appearing on computers, mobiles, home consoles, or online servers, arcade cabinets require players to pay a small increment of money (dime, quarter, dollar) for a single play. Bernstein (2003) provides an interesting description of this process:

The arcade games are designed, in part, to convince players to part, and keep parting, with their quarters. This part of the action feels like slot-machine gambling, with the obvious difference that there is no cash payoff, only more time on line. Staying plugged in, more time to play, is the fix. The arcade games are all about buying time and the possibility of extending the nominal, intensely atomized, thirty-second (or so) minimum play to a duration that feels, for all impractical purposes, unbounded (p. 157).

As Bernstein points out, arcade games were based on an economy of time where skillful players were rewarded with longer games. Noel Bushnell, founder of Atari, and creator of the first arcade game, sums up the economic reasoning behind his design philosophy by insisting that arcade games “should be easy to learn, impossible to master” (as cited in “It’s all Fun and Games”, 2003, p. 12).

When considering the immense difficulty associated with many arcade games, the economic imperative becomes quite clear. Some games, like *Donkey Kong* (1981), do not even have programmed endings. In a mode similar to a virtual peep show, a cabinet would tease a player with a tiny segment of the game world enticing him or her (in most cases him) to spend another quarter. Unfortunately, emulation fundamentally alters this aesthetic by allowing individuals to play for free. In order to illustrate this process, it is necessary to draw upon an example.

Ripcord, released by Exidy games in 1979, is one of the few games the MAME project has obtained the permission to distribute freely. In the game, players must

choose when to eject an avatar from a passing plane before guiding the stick figure past moving helicopters to the safety of several platforms located on the bottom of the screen. By pressing one of the action buttons, players can slow the avatars descent by releasing a parachute, which also allows for increased control of side-to-side movement. Points and bonuses are awarded for landing on specific platforms and a turn is lost if the avatar touches a helicopter or hits the ground. The goal of playing is to obtain the highest score possible, which is saved and displayed during the cabinet demo mode.

Within the context of the MAME, instead of inserting a coin, players simply tap the number 5 on the keyboard to automatically add a credit to the machine. The button can be pressed as many times as the user wishes providing as many chances as desired. As a result, while players are given the ability to play as much as they like, the thrill of earning extra plays is lost in an environment of unlimited credits. With emulation, gamers no longer play for time in the way Bernstein (2003) describes.

In addition, at the time of this writing, the MAME does not save high scores, which according to Amis (1982), was “a powerful incentive in (arcade) game praxis—a yearning perhaps connected with schooldays and the honor or notoriety of having your name chalked up on the board” (p. 25). Interestingly enough, there was a point in the project’s development when a high score function was added, but it has since been removed from subsequent versions because it affected the way some games ran (Aaron Giles, 2008). As a result, the MAME does not compete with arcade game play because it cannot replicate the experience.

While *Ripcord* is just one example, the aesthetics of more linear arcade games, where players encounter bosses and levels, are also compromised by emulation. Difficult game segments that may have taken months for arcade players to surpass can be played repeatedly when quarters are in infinite supply. From this perspective, since the MAME fundamentally alters the ludic aesthetic of early arcade games, it is tempting to view emulation as an example of what Mike Featherstone (2006) describes as a “counter image of the archive” (p. 594), where “meaning ceases to be contained in a bounded physical textual form, the page or document, but is able to flow through networked nodes (p. 595). However, since emulators are ludic technologies (Consalvo, 2007) created by hacking practice, the MAME does not necessarily counter traditional archival claims to truth as much as it plays with them.

Hacking the Institutional Archive

According to Jacques Derrida (1995), the meaning of the term *archive* comes “from the greek *arkheion*: initially a house, a domicile, an address, the residence of the superior magistrates, the archons, those who commanded. The citizens who thus held and signified political power were considered to possess the right to represent the law” (p. 2). Furthermore, as Featherstone (2006) demonstrates, while the archive was initially conceived as a “site where official records were guarded and kept in

secrecy” to facilitate government, in the 19th century it “became seen as a repository of the national history and national memory” (pp. 191–192).

It is important to point out that many early and current institutional conceptions of the archive are rooted in the belief that documents speak truth in regard to history. Velody (1998) echoes this sentiment by insisting that “appeals to ultimate truth, adequacy and plausibility in the work of the humanities and social sciences rest on archival presuppositions” (p. 1). However, as Featherstone points out, an increased ability to both store and transfer data prompted by the development of digital technologies has created a “move away from the concept of the archive as a physical place to store records” to that of the “archive as a virtual site facilitating immediate transfer” creating “new conceptual problems about the identity, distinctiveness, and boundaries of the datum and the document” (pp. 595–596). From this perspective, since emulation works to remove games from their original platforms, the MAME project seems to embrace a digital archival emphasis on ease of access and search ability rooted in the belief that “the archive cannot provide a direct access to the past, but only a textual refiguring of it” (Featherstone, 2006, p. 596). However, upon closer inspection, the project does not reject an appeal to “ultimate truth” as much as it redefines truth at the material level of code. As a result, instead of rejecting the traditional institutional definition of the archive in favor of a database model, the MAME hacks the notion of a public archive as a means of circumventing the copyright problem that continues to plague video game preservation efforts. Emulators are clever cheats that allow game code to be accessed after its platform has broken down.

In order to contextualize the MAME as hacking practice, it becomes necessary to define what hacking means. Unfortunately, within the mainstream media, the term is often used negatively to describe criminal behavior. However, as Coleman (2011) demonstrates, the practice is notoriously difficult to conceptualize using current political frameworks because hackers are “deeply entangled in various distinct institutional and cultural webs and economic processes” (p. 512). For Coleman “hacker and geek politics are geared toward reordering the technologies and infrastructures that have been part of the fabric of everyday life. A close corollary is that geeks and hackers often care deeply about and intervene in a networked infrastructure that can be, at some level, reordered without asking permission of any institution or actor” (p. 515).

Interestingly enough, Coleman’s description corresponds with the mandate on the MAME website, which states that the project’s primary “purpose is to be a reference to the inner workings of the emulated arcade machines” for both “educational purposes” and “preservation purposes in order to prevent many historical games from disappearing forever once the hardware they run on stops working” (About MAME, para. 1. n.d.). From this perspective the “MAME team does not reject an institutional archival perspective.” When describing the project, former coordinator Aaron Giles insists “the MAME is to arcade games what the “library of congress is to books” [...] a “documentation project” that is lacking in the documents (Giles, 2008).

Furthermore, instead of promoting a vision of a counter archive, Gile's description resonates with the paradoxes created by new media metaphors of data repositories that, according to Chun (2011), change "how archived materials are retrieved, or 'reanimated' and thus experienced" (p. 100). In addition, while the MAME uses emulation to remove arcade games from their original machinic context, unlike database models of the archive, the project is not designed to provide the general public with immediate access to games because doing so would be a violation of copyright. Due to different cabinet designs, the coding for arcade games are embedded within a plethora of storage media that do not necessarily fall under legally protected backup provisions in many nations. As Schut (2012) indicates, Canada's recent Bill C-10 update to the copyright act does not clearly stipulate whether a new interoperability provision (30.06) makes the use of emulation legal for scholarly research. As a result, despite recent updates to the copyright act, in Canada, using the MAME for scholarly research still falls into a legal gray area.

In addition, while it may be tempting to slide into mainstream depictions of hacking and view emulation as nothing more than a well-coordinated community of video game pirates, it is important to note that if a user does not have the legal right to access a specific game's source code, use is frowned upon. According to the project website:

It is not our intention to infringe on any copyrights or patents on the original games. All of MAME's source code is either our own or freely available. To operate, the emulator requires images of the original ROMs, CDs, or hard disks from the arcade machines, which must be provided by the user. No portions of the original game code are included in the executable ("About MAME," para. 2. n.d.).

In a further effort to discern piracy, the frequently asked questions section of the website insists that ROMs can be obtained legally by purchasing a license "via a distributor or vendor who has proper authority to do so"; downloading "one of the ROM sets that has been released for free to the public for non-commercial use";¹ or purchasing an actual arcade PCB (the hardware portion containing the game code) then reading the "roms or disks yourself" and letting "MAME use the data" ("FAQ: ROMS," para. 10. n.d.). From this perspective, the MAME is clearly not designed to be a database archive emphasizing broad accessibility and ease of use. The emulator is currently intended to serve as a technical aide for private use.

In addition, from an archive as database perspective, requiring users to secure their own ROM sets in order to use the emulator is far from ideal. Such a design is clearly the result of the project team's concerns over illegal usages, which are also reflected in the emulator's interface. Before the MAME loads a game, the user is presented with a screen asking if he or she has the proper permission to run the code. As a result, the project is clearly exhibitiv of what Coleman (2011) describes as the do it yourself ethos unique to hacker and geek publics where digital literacy "is often a requirement for participation acting as a gateway into a culture that 'is not wide open to all'" (p. 515).

So, while the MAME team actively discourages piracy, it is important to mention that they lack the means to stop other users from using their code to play copyrighted games. Illegal ROM sets can be obtained through torrent download, prompting companies like Nintendo to insist that the introduction of emulators represent “the greatest threat to date to the intellectual property rights of video game developers” (Nintendo, 2011, para. 11 n.d.). However, as commentators like Jenkins (2006) and Consalvo (2007) have suggested, barring some notable exceptions, the video game industry has a rich history of ignoring copyright infringement and commodifying hacking practices.

A History of Cheating

In *Cheating: Gaining Advantage in Video Games*, Consalvo (2007) describes the development of items such as game sharks (technical add-ons legally allowing players to obtain specific advantages while playing games) and mod chips (devices that can be added to game consoles allowing users to bypass security restrictions and play prated games) as ludic technologies designed to challenge the control companies like Nintendo and Microsoft dictate over the products they sell (p. 56). From this perspective, Consalvo describes the history of gaming as a continuing process where “pressure and counterpressure ensure a productive system—one that keeps all (or most) attempts at monopolizing control at bay—and also ensures that new activities, new options, and new technologies are produced”(p. 61).

From this perspective, the MAME is an interesting case of a ludic technology designed to ensure that digital rights management does not result in a situation where games are lost due to industry negligence. So while the MAME team is adamant that redistributions of the source code “may not be sold, nor may they be used in a commercial product or activity” (“MAME legal information,” para. 1. n.d.), they are not opposed to companies who either own or have purchased the rights to classic arcade games using the project’s source code as a resource for developing commercial emulation. According to Giles, “that’s what it’s there for” (“The MAME,” 2008).

As the following blog entry from Mark Feldman indicates, the MAME has been used by various programmers contracted to port classic arcade games on to new platforms. In Feldman’s case, Midway, the copyright holder for *Spy Hunter* (1983), which is widely considered to be an arcade classic, lost the original source code forcing him to rely on an emulated MAME version in addition to sound effects provided by a fan site (whose owner was rewarded with a cease and desist letter from the publisher’s legal team) in order to deliver the port within the contracted time frame (Feldman, 2010, December 15). From this perspective, despite Nintendo’s concern, the video game industry has clearly benefited from the MAME’s development echoing Consalvo’s insistence that “the system needs the hackers and chip makers to push the boundaries of the allowable as well as to lay bare the limits that have been carefully shrouded over by dominant interests” (p. 61).

So while the MAME team has no problem with allowing the industry to use the project's source code as a resource for developing commercial emulation, it is important to note that by hacking the institutional definition of the archive, the project distances itself from commercial practices. This is done by seeking accuracy at the code level in order to ensure an arcade games moves and sounds like it used to complete with bugs and glitches. In contrast, commercial emulation practices often seek to modify code to remove bugs and optimize performance for specific platforms. According to Aaron Giles, by being a nonprofit project they have the luxury of saying "we don't care about performance, we want to do our best to get it right" ("The Multiple Arcade Machine Emulator", 2008), which paradoxically results in situations where some emulated games run much slower on current PC's due to the technical intricacies of emulation.

At the heart of code-based authenticity lies an emphasis on sound and image specifically in terms of time and movement. Running original code ensures that the images on screen will move in response to user input at the exact frame rate apparent in the original arcade cabinet. From this perspective, the MAME team favors technical accuracy over ease of use undercutting the argument that emulation is nothing more than piracy. For if piracy was the goal, then what would be the point of emulating games that run so slowly on current hardware systems that they are virtually unplayable?

Interestingly enough, by defining authenticity on a code level, the project is specifically designed so it will not compete with commercial emulation. In *Two Bits: The Cultural significance of Free Software*, Kelty (2008) expands on this point insisting that "geeks do not wish to compete qua capitalists or entrepreneurs unless they can assure themselves that (qua public actors) they can compete fairly. It is an ethic of justice shot through with an aesthetic of technical elegance and legal cleverness" (pp. 22–23). In many respects this statement corresponds with the discourse surrounding the MAME, with the coordinators insisting that using the emulator to play games "serves primarily to validate the accuracy of the documentation" ("FAQ: About", n.d.) as opposed to competing with current arcade games. For, as is the case with many open source projects like Linux, the MAME is a hobby worked on by hundreds of programmers (many whom, as in Giles case, actually work in the software industry) driven by the enjoyment they experience through their creative exploration of technology.

Interestingly enough, this desire to explore the inner workings of computer hardware corresponds with the hacking discourse that emerged from the MIT computer department where many early digital games were programmed by students who were supposed to be conducting research. According to Haddon (1988), among MIT students, hacking initially referred to "a stylish technical innovation undertaken for the intrinsic pleasure of experimenting" whereby "hackers explored and enhanced the capabilities of these new machines" (p. 56). Simon (2007) alludes to a similar process when describing how hacking turns the machine "into a source of pleasure that may be coextensive with the game itself" (p. 191); a sentiment echoed by Andrew

Giles when he insists that “Nothing beats seeing something up and running for the first time and your like wow, so that’s how it worked” (‘The Multiple Arcade Machine Emulator’, 2008).

In closing, to return to the somewhat paradoxical notion of a documentation project without documents, the MAME hacks the institutional notion of the archive by altering the machinic context of the platform and defining video game code as an entity that speaks truth. From this perspective, there is a definite overlap between online emulation practices, open source projects that conceptualize computer code as a form of speech (Coleman, 2009), and various art and programming practices that hack digital technology. In the curatorial statement from a recent exhibition of video game-based platform art, Mr. Ghosty (aka Skot Deeming, 2012) describes the contingency of platforms as exhibitiv of forms of “post consumer play” with the medium itself which causes “the defining characteristics of gaming cultures and platforms to shift over time” (2012). Likewise, in *Racing the Beam*, Montfort and Bogost (2009) describe how numerous programmers developing games for the Atari VCS found ways to exceed the limits of what the console was believed to be capable of doing effectively changing how the VCS functioned over time. So while it may be tempting to dismiss emulation as an “unstable preservation solution,” it is important to remember that hacking practices are an important element of video game culture that corresponds with the paradoxes created by broader shifts in digital culture. Instead of rejecting archival claims to truth, the MAME discourse redefines digital truth as an inherent element of gaming code.

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Note

1. Fourteen of these ROMs are included in the project website; a small number considering the fact that the MAME can emulate over 6,000 games.

References

- Amis, M. (1982). *Invasion of the space invaders*. London, England: Hutchinson.
- Barwick, J., Dearnley, J., & Muir, A. (2011). Playing games with cultural heritage: A comparative case study analysis of the current status of digital game preservation. *Games and Culture*, 6, 373–390.
- Bernstein, C. (2003). Play it again, Pac-Man. In M. J. P. Wolf & Bernard Perron (Eds.), *The video game theory reader* (pp. 155–168). New York, NY: Routledge. (Reprinted from *Postmodern Culture*_2.1. 1991).

- Chun, W. H. K. (2011). *Programmed visions: Software and memory*. Cambridge: The MIT Press.
- Coleman, G. (2009). Code is speech: Legal tinkering, expertise, and protest among free and open source software developers. *Cultural Anthropology*, 24, 420–454.
- Coleman, G. (2011). Hacker politics and publics. *Public Culture*, 23, 511–516.
- Consalvo, M. (2007). *Cheating: Gaining advantage in video games*. Cambridge: The MIT Press.
- Deeming, S. (2012). Curatorial statement. In *Reset: Post-consumer game culture exhibition*. Winnipeg, Manitoba, Canada: Platform Gallery.
- Derrida, J. (1995). *Archive fever: A Freudian impression*. (Eric Prenowitz, Trans.). Chicago & London: The University of Chicago Press.
- Donkey Kong*. Nintendo, 1981.
- Featherstone, M. (2006). Archive. *Theory, Culture, Society*, 23, 591–596.
- Feldman, M. (2010, December 15). The day the MAME saved my ass. Retrieved from <http://www.ppl-pilot.com/mame.aspx>
- Gow, A., & Ross, S. (1999). *Digital archaeology: Rescuing neglected and damaged data resources*. London: Library Information Technology Center. Retrieved from www.ukoln.ac.uk/services/elib/papers/supporting/pdf/p2.pdf
- Giles, A. (2008). The multiple arcade machine emulator. Proceedings of California Extreme 2008. San Jose, CA. Retrieved from <http://www.youtube.com/watch?v=GjLZd4972jA&feature=related>
- Haddon, L. (1988). Electronic and computer games: The history of an interactive medium. *Screen*, 29, 52–73.
- It's all Fun and Games. (2003, August 18). *Newsweek*, p. 12.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York: New York University Press.
- Juul, J. (2009). *A casual revolution: Reinventing video games and their players*. Cambridge: MIT Press.
- Kelty, C. (2008). Two bits: The cultural significance of free software. Duke University Press. Retrieved from <http://jace.zaiki.in/files/2009/05/29/twobits.epub>
- Lowood, H. (2004). Playing history with games: Steps towards historical archives of computer gaming. *The Annual Meeting of the American Institute for Conservation of Historic and Artistic Works*. Portland, OR. Retrieved from <http://aic.stanford.edu/sg/emg/library/pdf/lowood/Lowood-EMG2004.pdf>
- McDonough, J. P., Olendorf, R., Kirschenbaum, M., Kraus, K., Reside, D., Donahue, R., . . . Rojo, S. (2010). *Preserving virtual worlds Final report*. US Library of Congress. Retrieved from <http://hdl.handle.net/2142/17097>
- Montfort, N., & Bogost, I. (2009). *Racing the beam: The atari video computer system*. Cambridge: The MIT Press.
- Nintendo. (2011). Legal Information (Copyrights, Emulators, ROMS, ect.). Retrieved from http://www.nintendo.com/corp/legal.jsp#download_rom
- Ripcord*. (1979). Exidy, 1979. Retrieved from <http://mamedev.org/roms/ripcord/>
- Schut, K. (2012, June 4–5). Playing with a new problem: Copyright and video games in education and scholarship. *ABC Copyright Conference*. Ottawa, ON: University of Ottawa.

- Retrieved from <http://abcconference2012.pbworks.com/w/file/54748825/KSchut%20%20Video%20games%2C%20copyright%2C%20educ ation.pptx>
- Simon, B. (2007). Geek chic: Machine aesthetics, digital gaming, and the cultural politics of the case mod. *Games and Culture*, 2, 175–119.
- Spy Hunter. (1983). Bally Midway, 1983.
- Swalwell, M. (2009). Towards the preservation of local computer game software: Challenges, strategies, reflections. *Convergence*, 15, 263–279.
- The MAME Team. (n.d.). About MAME. Retrived from <http://mamedev.org/about.html>
- The MAME Team. (n.d.). FAQ: ROMS. Retrieved from <http://mamedev.org/devwiki/index.php/FAQ:ROMs>
- The MAME Team. (n.d.). FAQ: About. Retrieved from <http://mamedev.org/devwiki/index.php/FAQ:About>
- The MAME Team. (n.d.). MAME legal information. Retrieved from <http://mamedev.org/legal.html>
- Velody, I. (1998). The archive and the human sciences: Notes towards a theory of the archive. *History of the Human Sciences*, 11, 1–16.
- Wolf, M. J. P. (2003). Abstraction in the video game. In Mark J. P Wolf & Bernard Perron (Eds.), *The video game theory reader*.(pp. 47–67). New York, NY: Routledge.

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