LEA is a publication of Leonardo/ISAST.

LEONARDO
THE INTERNATIONAL SOCIETY FOR THE ARTS, SCIENCES AND TECHNOLOGY

Sabancı Üniversitesi

Goldsmiths
UNIVERSITY OF LONDON

VOL 17 NO 2 VOLUME EDITORS LANFRANCO ACETI AND SIMON PENNY
CONTRIBUTORS STEPHANIE BOLUK, MAURO CARASSAI, KENNY CHOW, SHARON DANIEL, KRISTEN GALVIN, FOX HARRELL, SNEHA VEERAGOUDAR HARRELL, GARNET HERTZ, JI-HOON FELIX KIM, PATRICK LEMIEUX, ELISABETH LOSH, MARK MARINO, MICHAEL MATEAS, CHANDLER B. MCWILLIAMS, CARRIE NOLAND, ANNE SULLIVAN, NOAH WARDRIP-FRUIN, JICHEN ZHU

SPECIAL ISSUE

DAC 09

after media : embodiment and context

Copyright 2012 ISAST
Leonardo Electronic Almanac
Volume 17 Issue 2
January 2012
ISSN: 1071-4391
ISBN: 978-1906897-16-1
The ISBN is provided by Goldsmiths, University of London

Editorial Address
Leonardo Electronic Almanac
Sabanci University, Orhanli - Tuzla, 34956
Istanbul, Turkey

Email
info@leoalmanac.org

Web
» www.leoalmanac.org
» www.twitter.com/LEA_twitts
» www.flickr.com/photos/lea_gallery
» www.facebook.com/pages/Leonardo-Electronic-Almanac/209156896252

Leonardo Electronic Almanac is published by:
Leonardo/ISAST
211 Sutter Street, suite 501
San Francisco, CA 94108
USA

Leonardo Electronic Almanac (LEA) is a project of Leonardo/The International Society for the Arts, Sciences and Technology. For more information about Leonardo/ISAST's publications and programs, see http://www.leonardo.info or contact isast@leonardo.info.

Leonardo Electronic Almanac is produced by Passero Productions.

Making Inroads: Promoting Quality and Excellency of Contemporary Digital Cultural Practices and Interdisciplinarity

I would like to welcome you to the first special volume of the Leonardo Electronic Almanac. *DAC09: After Media: Embodiment and Context*, is a volume that generated from the conference by the same name that Prof. Penny chaired at the end of 2009.

DAC09: After Media: Embodiment and Context is the first of a series of special volumes of the Leonardo Electronic Almanac that are realized in collaboration with international academic, editors and authors.

Prof. Penny was inspired for this LEA special issue by the continuous developments in the interdisciplinary arena and in the fields of new media and digital art culture. He wanted to collate research papers that would provide the seeds for innovative thinking and new research directions. The authors featured in this volume, to whom we are most grateful for their hard work, will provide the reader with the opportunity to understand and imagine future developments in the fields of digital art culture and interdisciplinarity.

As I look at the electronic file of what we now internally refer to simply as *DAC09* the first issue of the revamped LEA, *Mish Mash*, printed and delivered by Amazon, sits on the desk next to my keyboard. The possibilities and opportunities of e-publishing, which also has physically printed outcomes, provide me with further thoughts on the importance and necessity of the work that is done by 'small publishers' in the academic field. The promising news of a new open access journal to be launched by The Wellcome Trust or the 'revolution' of researchers against Elsevier through the website http://thecostofknowledge.com/ with 9510 Researchers Taking a Stand (Thursday, April 12, 2012 at 10:57 AM) highlights the problems and issues that the industry faces and the struggles of young researchers and academics.

The contemporary academic publishing industry has come a long way from the first attempts at e-publishing and the revolution, if it can be defined as such, has benefited some and harmed others.

As the struggle continues between open access and copyrighted ownership,[1] the 'revelation' of a lucrative academic publishing industry, of economies of scales, of academics exploited by a system put in place by publishing giants (into which some universities around the globe have bought into in order to have an internationally recognized ranking system) and the publishers' system of exploitation structured to increase the share of free academic content to then be re-sold, raises some essential questions on academic activity and its outputs.

ISSN 1071-4391 ISBN 978-1-906897-16-1

The answers to these problems can perhaps be found in the creativity of the individuals who participate in what is, at times, an harrowing process of revisions, changes, reviews, replies and rebuttals. This is a process that is managed by academics who donate their time to generate alternatives to a system based on the exploitation of content producers. For these reasons I wish to thank Prof. Simon Penny and all the authors who have contributed to *DAC09: After Media: Embodiment and Context*.

Simon Penny in his introduction to this first LEA special volume clearly states a) the importance of the *DAC09* and b) the gravitas and professional profile of the contributors. These are two points that I can support wholeheartedly, knowing intimately the amount of work that this volume has required in order to maintain the high standards set by *Mish Mash* and the good reception it received.

For this reason in announcing and presenting this first special volume I am proud to offer readers the possibility of engaging with the work of professionals who are contributing to redefining the roles, structures and semantics of new media, digital art practices and interdisciplinarity, as well as attempting to clarify what digital creativity is today and what it may become in the future.

The field of new media (which are no longer so new and so young – I guess they could be better described as middle aged, slightly plump and balding) and digital practices (historical and contemporary) require new definitions and new engagements that move away from and explore beyond traditional structures and proven interdisciplinary partnerships.

DAC09: After Media: Embodiment and Context is a volume that, by collating papers presented at the DAC09 conference, chaired by Prof. Simon Penny, is also providing recent innovative perspectives and planting seeds of new thinking that will redefine conceptualizations and practices, both academic and artistic.

It also offers to the reader the possibility of engaging with solid interdisciplinary practices, in a moment in which I believe interdisciplinarity and creative practices are moving away from old structures and definitions, particularly in the fraught relationship between artistic and scientific disciplines. If 'cognitive sciences' is a representation of interdisciplinarity between artificial intelligence, neurobiology and psychology, it is also an example of interdisciplinary interactions of relatively closely related fields. The real problem in interdisciplinary and crossdisciplinary studies is that these fields are hampered by the methodological problems that still today contrapose in an hierarchical structure scientific methodologies versus art and humanities based approaches to knowledge.

This volume is the first of the special issues published by LEA and its appearance coincides with the newly revamped website. It will benefit from a stronger level of advocacy and publicity since LEA has continued to further strengthen its use of social platforms, in fulfillment of its mission of advocacy of projects at the

ISSN 1071-4391 ISBN 978-1-906897-16-1

intersection of art, science and technology. *DAC09* will be widely distributed across social networks as open access knowledge in PDF format, as well as being available on Amazon.

I extend a great thank you to all of the contributors of *DAC09: After Media: Embodiment and Context* and wish them all the very best in their future artistic and academic endeavors.

Lanfranco Aceti
Editor in Chief, Leonardo Electronic Almanac
Director, Kasa Gallery

ACKNOWLEDGEMENTS

I would like to thank Ozden Sahin, LEA Co-Editor, for having delivered with constancy another project of which LEA could be proud. The LEA special issues are more similar to small books – 200 pages is not a small endeavor – that require special care and attentive selection.

I am very grateful to Prof. Simon Penny for the hard work that he has put into this volume and to the authors who have patiently worked with us.

To all of you my heartfelt thanks.

DAC09: After Media: Embodiment and Context is the first special volume of the Leonardo Electronic Almanac to be followed by many others that are currently in different stages of production, each of them addressing a special theme and focusing on bringing to the mainstream of the academic debate new forms of thinking, challenging traditional perspectives and methodologies not solely in the debates related to contemporary digital culture but also in the way in which these debates are disseminated and made public.

To propose a special volume please see the guidelines webpage at: http://www.leoalmanac.org/lea-special-issues-submission-instructions/

REFERENCES AND NOTES

1. Thomas Lin, "Mathematicians Organize Boycott of a Publisher," *The New York Times*, February 13, 2012, http://www.nytimes.com/2012/02/14/science/researchers-boycott-elsevier-journal-publisher.html (accessed March 20, 2012).

 ISSN 1071-4391 ISBN 978-1-906897-16-1

Two decades of Digital Art and Culture

An introduction to the LEA DAC09 special edition

by

Simon Penny

Director of DAC09
Professor of Arts and Engineering
University of California Irvine

This volume of LEA is composed of contributions drawn from participants in the 2009 Digital Art and Culture conference held at the University of California, Irvine in December 2009. DAC09 was the eighth in the Digital Art and Culture conference series, the first being in 1998. The DAC conference series is internationally recognized for its progressive interdisciplinarity, its intellectual rigor and its responsiveness to emerging practices and trends. As director of DAC09 it was these qualities that I aimed to foster at the conference.

The title of the event: After Media: Embodiment and Context, was conceived to draw attention to aspects of digital arts discourse which I believe are of central concern to contemporary Digital Cultural Practices. "After Media' queries the value of the term 'Media Arts' – a designation which in my opinion not only erroneously presents the practice as one concerned predominantly with manipulating 'media', but also leaves the question of what constitutes a medium in this context uninterrogated. 'Embodiment and Context' reconnects the realm of the digital with the larger social and physical world.

'Embodiment' asserts the phenomenological reality of the fundamentally embodied nature of our being, and its importance as the ground-reference for digital practices. 'Embodiment' is deployed not only with respect to the biological, but also with reference to material instantiations of world-views and values in technologies, a key example being the largely uninterrogated Cartesianisms and Platonisms which populate computational discourse. Such concerns are addressed in contemporary cognitive science, anthropology and other fields which attend to the realities of the physical dimensions of cognition and culture.

'Context' emphasises the realities of cultural, historical, geographical and gender-related specificities. 'Context' brings together site-specificity of cultural practices, the understandings of situated cognition and practices in locative media. The re-emergence of concerns with such locative and material specificity within the Digital Cultures community is foregrounded in such DAC09 Themes as Software and Platform Studies and Embodiment and Performativity.

The DAC09 conference included around 100 papers by an international array of contributors. In a desire to be maximally responsive to current trends, the conference was to some extent an exercise in self-organisation by the DAC09 community. The call for papers and the structure of the event was organized around nine conference themes which were themselves the result of a call to the community for conference themes. The selected themes were managed largely by those who proposed them. Much credit for the success of the event therefore goes to these hard-working 'Theme Leaders' : Nell Tenhaaf, Melanie Baljko, Kim Sawchuk, Marc Böhlen, Jeremy Douglass, Noah Wardrip-Fruin, Andrea Polli, Cynthia Beth Rubin, Nina Czegledy, Fox Harrell, Susanna Paasonen, Jordan Crandall, Ulrik Ekman, Mark Hansen, Terry Harpold, Lisbeth Klastrup, and Susana Tosca, and also to the Event Organisers: David Familian, Michael Dessen, Chris Dobrian, Mark Marino and Jessica Pressman. I am particularly grateful to Ward Smith, Information Systems Manager for DAC09, who for two years, as my sole colleague on the project, managed electronic communications, web design and the review and paper submission processes amid, as he would put it, a 'parade of indignities'. In the several months of final planning and preparation for the event, the acumen and commitment of Elizabeth Losh and Sean Voisen was invaluable.

I first published on what we now refer to as digital arts in 1987. [1] Not long after, I was lucky enough to have the opportunity to attend the first ISEA conference in 1988. Since that date I have been actively involved in supporting the development of critical discourses in the field, as a writer, an editor and an organizer of events. My role as director of the DAC09 conference gave me a perspective from which to reflect on the state of digital arts discourse and its development over two decades. As I discussed in a recent paper, [2] the first decade on media art theory was a cacophonous interdisciplinary period in which commentators from diverse fields and disciplines brought their expertise to bear on their perceived subject. This created a scenario not unlike that of various viewers looking into a house via various windows, none of them perceiving the layout of the house, nor the contents of the other rooms. In the ensuing decade, a very necessary reconciliation of various disciplinary perspectives has occurred as the field has become truly a 'field'.

While post structuralist stalwarts such as Deleuze and Derrida continue to be referenced in much of the more critical-theory oriented work in Digital Cultures, and the condition of the posthuman and posthumanist are constantly referenced, theoretical reference points for the field are usefully broadening. The emerging field of Science and Technology Studies has brought valuable new perspectives to media arts discourses, counterbalancing the excesses of techno-utopianism and the sometimes abstruse intellectualism of post-structuralist theoretical discourses. In this volume, Mark Tuters provides an exemplar of this approach in his *Forget Psychogeography: Locative Media as Cosmopolitics*, bringing Rancière and Latour to bear on a discussion of HCI, Tactical Media and Locative Media practices. Tuters provides a nuanced argument replete with examples which questions the sometimes, superficial and dogmatic re-citation of the originary role of the Situationists with respect to such practices. At DAC09, Connor McGarrigle also took a thoughtful revisionist position with respect to the Situationists. [3]

In this context, the new areas of Software Studies and Platform Studies have emerged and have been nurtured in previous DAC conferences. In this spirit, Chandler McWilliams attempt to "thread the needle between a reading of code-as-text that obfuscates the procedural nature of code, and an overly technical description of programming that reinstates the machine as the essential arbiter of authentic acts of programming" is emblematic of the emergence of Software Studies discourses which are quintessentially interdisciplinary and erudite on both sides of the science wars divide. Similarly, Mark Marino's meditations on heteronormativity of code and the Anna Kournikova worm call for what he calls Critical Code Studies, here informed by queer theory. In their proposal for an 'AI Hermenteutic Network' Zhu and Harrell address the question of intentionality, a familiar theme in AI critical discourse (i.e., John Searle 'Minds,

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

Brains and Programs' 1980). Citing Latour, Agre, Hayles and others, they offer another example of the science-wars-sidestepping technical development based in interdisciplinary scholarship noted in the discussion of Chandler McWilliams' contribution.

Another trend indicative of the maturation of this field is its (re)-connection with philosophical discourse. In this context, the deep analysis of Electronic Literature in terms of Wittgensteinian Language Games by Mauro Carassia is something of a tour de force. While a tendency to extropianism is here not explicitly discouraged, this discussion places such technological practices squarely as indicators of transition to post-human subjectivity, and in the process, open the discussion to phenomenological, enactive and situated critiques as well a drawing in the relevance of pre-cognitivist cybernetic theorisation.

One of the aspects of contemporary media arts discourse which I hoped to foreground at DAC09 was questions of embodiment and engagement with contemporary post-cognitivist cognitive science. Several papers in the current collection reflect such concerns, and indeed they were foregrounded in several conference themes. One example of the value of the application of such theory is evidenced in Kenny Chow and Fox Harrells leveraging of contemporary neuroscience and cognitive linguistics in their deployment of the concept of "material-based imagination" in their discussion of Interactive Digital Artworks. In a quite different approach to embodiment and computation, Carrie Noland discusses choreography and particularly the choreography of Cunningham, with reference to Mauss and Leroi-Gourhan, and with respect to digital choreographic tools.

The DAC community did not choose to make Game Culture a focal theme in DAC09 – perhaps because the field has grown so quickly and has built up a structure of conferences and journals. Nonetheless, gaming culture was referenced throughout the event, and was the subject of numerous presentations, such as Josh and Karen Tannenbaums reconsideration of 'agency as commitment to meaning', which addressed the acknowledged problematic of the tension between authorial and user agency in terms of a critique of the humanist subject. Like wise, phraseology such as Boluk/Lemieux's: "player performance in and around games has matured to the point of beginning to express underlying serial logics through heavily mannered gameplay mechanics" (in their contribution to this volume) signals the establishment of a mature and erudite critical theory of games and gaming. On a more technical note, Sullivan/WardripFruin/Mateas make an argument for enriching computer game play by application of artificial intelligence techniques to the authoring of 'quests'.

As Digital Arts became established as a practice the question of pedagogy inevitably arose – what to teach and how to teach it. Though rhetorics of convergence pretend to the contrary, one cannot dispute the profound epistemological and ontological dilemmas involved in attempting to bring together intellectual environments of such disparate communities as engineers, artists and critical theorists, in the classroom and the lab. Interdisciplinarity was therefore the ground upon which these programs were developed, and each context inflected that idea with its own color. My own reflections on the subject are published at *Convergence.* [4] It therefore seemed timely to address pedagogy at DAC09. In the process of elaboration of digital cultural practices, such emerging practices have themselves come into consideration as pedagogical tools and systems. In this volume, Elizabeth Losh surveys and discusses various pedagogical initiatives (mostly in Southern California) deploying digital tools and environments. In a contribution which crosses between the pedagogy thematic and concerns with cognition, Harrell and Veeragoudar Harrell offer a report on a science, technology, engineering, and mathematics (STEM) educational initiative among at-risk students which considers the relationships between users and their virtual identities.

In his essay, Garnet Hertz discusses the work of three artists – Reed Ghazala, Natalie Jeremijenko, and Tom Jennings. None of them 'media artists' in the conventional sense, they, in different ways and for different purposes, re-purpose digital technologies. Rounding out this volume is presentation of two online artworks by Sharon Daniels which were presented at DAC09. *Public Secrets* and *Blood Sugar* are elegant web-based art-works, both poetic and examples of a committed activist practice.

In my opinion, this collection offers readers a survey of fields addressed at DAC09, and an indication key areas of active growth in the field. Most of them display the kind of rigorous interdisciplinarity I regard as characteristic of the best work in the field. While the science-wars rage on in certain quarters, in media arts discourse there appears to be an attitude of intelligent resolution – a result in no small measure of the fact that a great many such commentators and theorists have taken the trouble to be trained, study and practice on both sides of the great divide of the 'two cultures', and to take the next necessary step of attempting to reconciling or negotiate ontologies traditionally at odds. This professional profile was very evident at DAC09 and is represented by many of the contributors in this volume. Such interdisciplinary pursuits are in my opinion, extremely intellectually demanding. The obvious danger in such work is of superficial understandings, or worse, a simple re-citation of a new canon of interdisciplinary media studies. Dangers that, happily, none of the papers grouped here, and few of the papers presented at DAC09, fell victim of. ■

The electronic proceedings of DAC09 are available at this link: http://escholarship.org/uc/ace_dac09

REFERENCES AND NOTES

1. "Simulation Digitization, Interaction: The impact of computing on the arts," *Artlink, Art+ Tech Special Issue* 7, no. 3 and 4 (1987).
2. "Desire for Virtual Space: the Technological Imaginary in 90s Media Art," in *Space and Desire. Scenographic Strategies in Theatre, Art and Media*, eds. Thea Brejezk et al. (ZHdK Zurich: Zurich University of the Arts, 2010).
3. This paper, and all DAC09 papers referenced here, are available as part of the DAC09 proceedings, online at http://escholarship.org/uc/ace_dac09 (accessed March 2010).
4. Simon Penny, "Rigorous Interdisciplinary Pedagogy: Five Years of ACE," *Convergence* 15, no. 1 (February 2009): 31 - 54.

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

Leonardo Electronic Almanac

Volume 17 Issue 2

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

HUNDRED THOUSAND BILLION FINGERS

Seriality and Critical Game Practices

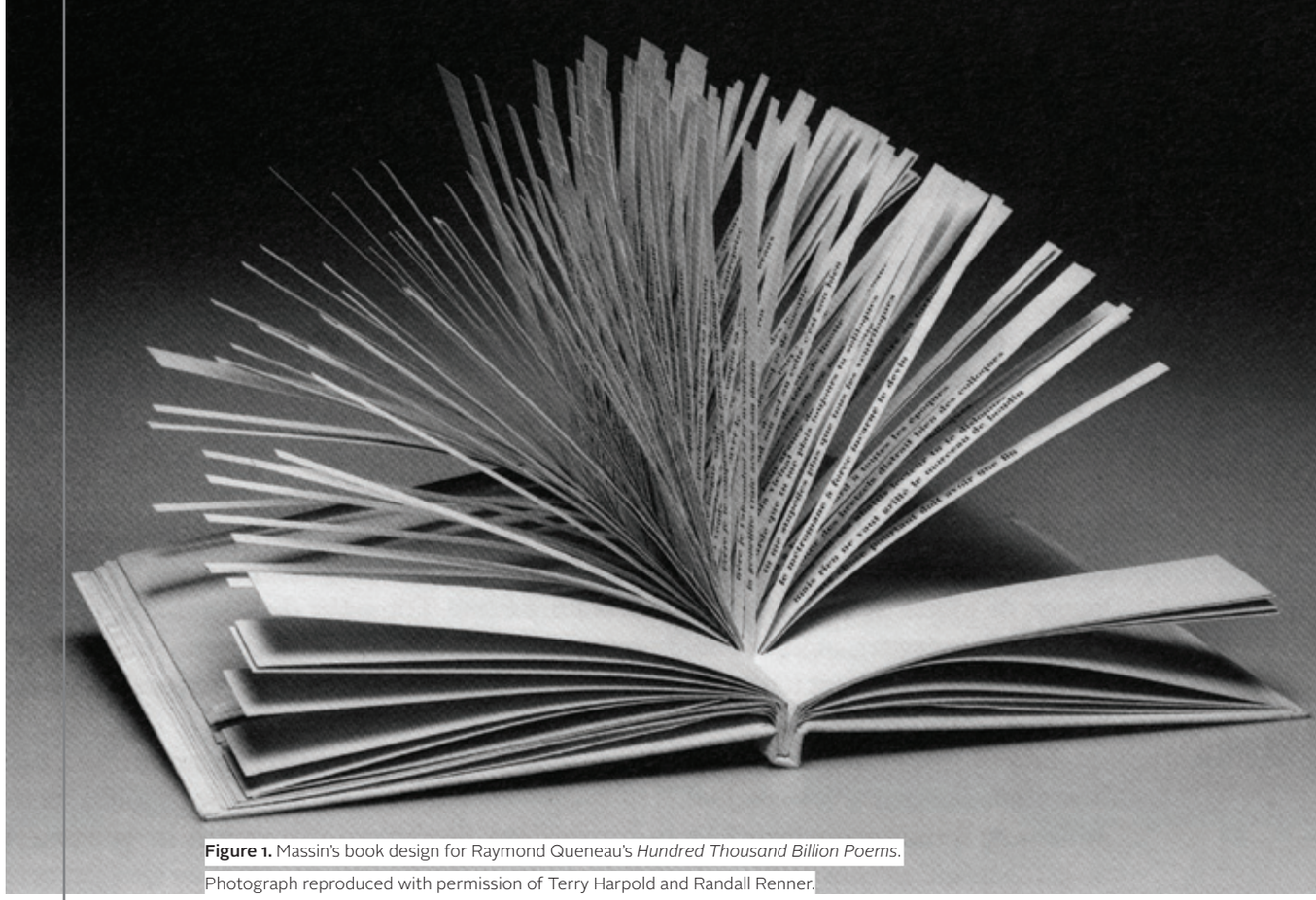


Figure 1. Massin's book design for Raymond Queneau's *Hundred Thousand Billion Poems*. Photograph reproduced with permission of Terry Harpold and Randall Renner.

ABSTRACT

The title of this essay borrows from Raymond Queneau's iconic* Hundred Thousand Billion Poems*, a sonnet generator capable of producing 10^{14} unique texts – a quantity that no one reader (or even a million readers) could parse in a lifetime. *While* Hundred Thousand Billion Poems *gestures towards the impossibility of ever accessing the totality of its many reading paths, computer games such as* Super Mario Bros. *limit the player to one isolated, incomplete perspective among an enormous (but finite) set of possible playthroughs. Despite this single-player experience, collective patterns of play emerge from the repetitive, procedural, and discrete elements – what Ian Bogost calls "unit operations" – that drive computational media. Following Mary Flanagan's approach to game criticism and Jean-Paul Sartre's notion of seriality framed in terms of contemporary theories of network culture, this essay examines two categories of "metagames" which "critically play" the serial logics intrinsic to computational media. Metagames are games about games and the examples in this essay are built inside, outside, or alongside* Super Mario Bros., inscribing twenty-five years of procedural play. *From remakes of* ROM *hacks to speedruns of sequencers, this eclectic collection of player-created modifications documents an alternative history of computer games defined not by the production of software but by play. Whether reading Queneau's book or playing computer games, the constraints of the poem or program produce a range of repetitions. Rather than subjecting the player to the mechanisms of control as defined by the rules of the game, the techniques documented in this essay successfully metagame their own serial conditions to model the movements of a hundred thousand billion fingers.*

 ISSN 1071-4391 ISBN 978-1-906897-16-1

ISSN 1071-4391 ISBN 978-1-906897-16-1

by

Stephanie Boluk & Patrick LeMieux

Stephanie Boluk
Media Studies Program
Vassar College
stboluk@vassar.edu
http://stephanieboluk.com

Patrick LeMieux
Department of Art, Art History, and Visual Studies
Duke University
patrick.lemieux@duke.edu
http://patrick-lemieux.com

INTRODUCTION

All Thumbs

Over the past twenty-five years thousands of thumbs have piloted herds of Marios over goombas and green pipes before sending the plumbers to their collective doom down the first pit of *Super Mario Bros.* (1985). Typically these manual activities remain distinct from one another, isolated in the homes of countless users. [1] Upon "game over" or "reset," the history of in-game actions are effaced and the Sisyphean task of rescuing the princess begins anew. Even the concept of multiple lives built into *Super Mario Bros.* betrays this invisible mass repetition. While the individual experience of play arises from a unique and irreducible assemblage of complex technological, conceptual, haptic, and narrative phenomena, players unconsciously participate in a vast network of composite actions that make up the aggregate histories of digital environments. The princesses are always in other castles, there are always second quests, and hundreds of thousands of fingers continue to direct parallel processes in digital landscapes.

In 1961, Oulipo co-founder Raymond Queneau produced *Hundred Thousand Billion Poems.* The Oulipo's experimental practice of incorporating mathematical systems with literary production, writing under constraints, and making use of combinatory poetics is now widely regarded as a precursor to the aesthetic strategies commonly seen in digital media production. [2] *Hundred Thousand Billion Poems* is a sonnet generator capable of producing 10^{14} unique poems. It is impossible for a single individual (or even a million individuals) to read every iteration of Queneau's program though the book-form is a slender ten pages long, with only fourteen lines per page (Fig. 1). In this work Queneau created a highly constrained text with a reading potential that greatly exceeds human capacity.

While *Hundred Thousand Billion Poems* gestures towards the impossibility of ever accessing the totality of these many reading paths, videogames such as *Super Mario Bros.* limit the player to one isolated, incomplete perspective among an enormous (but finite) set of possible playthroughs emerging from interactions with an eight button controller. [3] Whether reading Queneau's book or playing a videogame, the constraints of poem and program produce repetitions. By their very nature, procedural systems limit possible output to a finite set of discrete values. Over time, individual engagements with each process show signs of syncing, slipping, bleeding, and repeating as readers and players alike mash through a billion remixes of prearranged ludic combinations.

There is a key difference, however, between a hundred thousand billion poems and a hundred thousand billion twitching fingers. Whereas Queneau's work directly juxtaposes each individual reading path with the immensity of possibilities, the gameplay of *Super Mario Bros.* obfuscates this potential. Players do not experience the multiplicity, but rather the singularity of each engagement as past playthroughs vanish, disappearing in time. But what happens when the reset button is removed? When in-game actions are not only recorded and analyzed, but also reorganized into new forms of play? What happens when the metagame is fed back into the system?

In recent years, experimental practices have emerged which do not simply rely on serial structures, but critically engage the conditions from which so many games are designed and consumed. In *Critical Play: Radical Game Design* (2010), Mary Flanagan argues that "games carry beliefs within their representational systems and mechanics" and "[c]riticality in play can be fostered in order to question an aspect of a game's 'content,' or an aspect of a play scenario's function that might otherwise be considered a given or necessity." [4]

This essay will examine two categories of metagames which "critically play" the serial logics intrinsic to *Super Mario Bros.* and videogames in general. The first category features systems which, using a single input, translate one player's actions onto multiple platforms or outputs. These practices include multi-game tool-assisted speed runs (TAS) in which one controller is used to operate multiple games simultaneously and videogame mashups that collage game mechanics appropriated from multiple sources. The second category of serial software reverses this relation to focus on games that produce a proliferation of player actions within a single platform or output. Some of the strategies from this group include games which enable the recording and playback of player performances, scripted artificial intelligence which parses all the available options for traversing a given level, and mass bots or AI swarms whose agents behave according to the rules of the game and resemble crowd or fluid dynamics when composited together. These metagames and metagaming practices may not be popular, but they explicitly frame the serial structures of software to identify both the conditions neccesary for and the effects of computer gaming.

From Newspapers to Nintendo

The term seriality is generally used to mean objects that are arranged in some form of a series, whether temporal, spatial, or conceptual. In literature and popular media, seriality can refer to stories or publications that are released in intervals over a period of time or constructed with forced pauses incorporated into the reception of the work. Alternately, the form of seriality associated with Alain Robbe-Grillet and the *nouveau roman* or the minimalism of Donald Judd and Sol LeWitt generally refers to a more synchronic form of seriality based on the discontinuity and repetition of multiple objects at the same time. Within the art world, the serial production of the Minimalists as well as Pop artists (e.g., Andy Warhol's famous soup

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

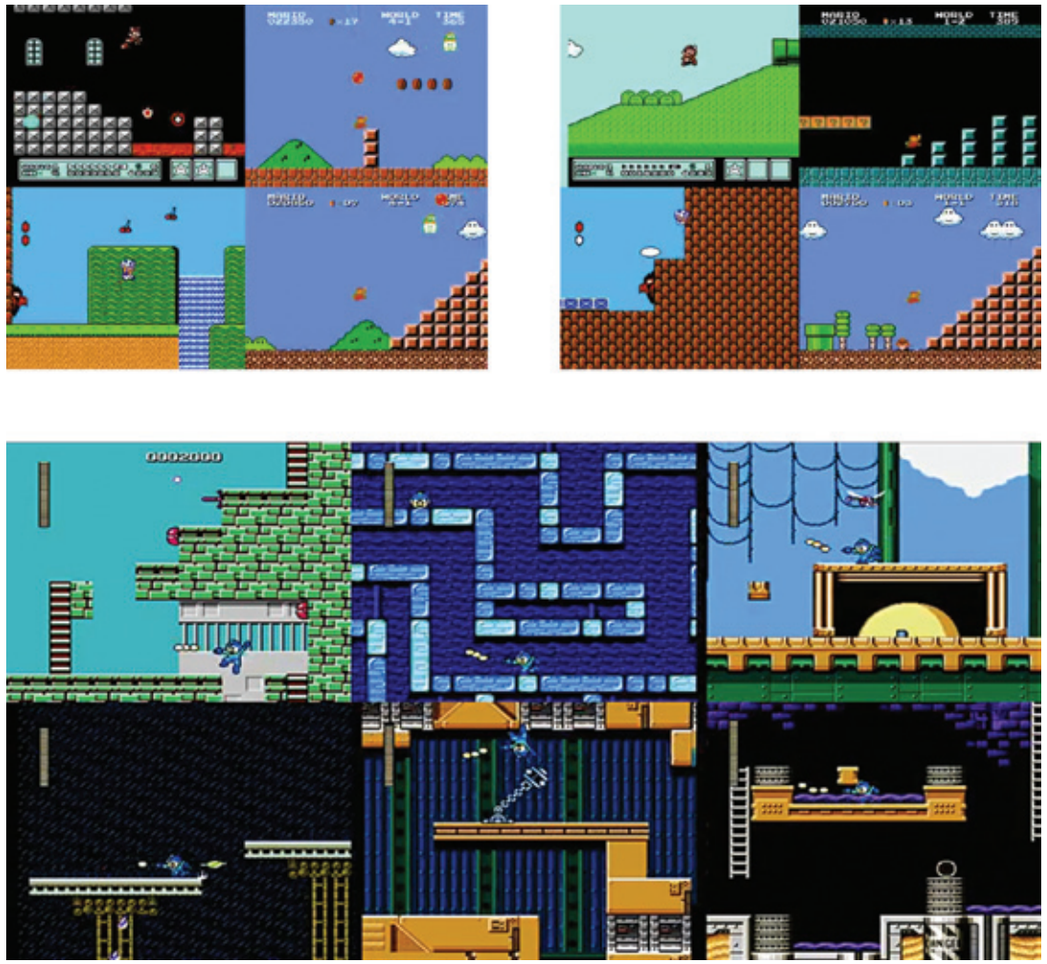


Figure 2. A quadrun of four Super Mario games by agawaf and a hexrun of six Mega Man games by Yashar Nasirian.

can screenprints) were ways of critically reflecting the ubiquitous environment of industrial commodity culture. In computing, seriality arises from both the formal logic of digital information (e.g., discrete numerical values sampled linearly according to processor speed) and the limitations of the human-computer interface (HCI). What binds these competing forms of seriality, appearing in fine art, popular culture, philosophy, statistics, and computer science is their relationship to industrial culture. Modes of mass production, consumption, and organization rely heavily on serial logics. The software practices we examine in this paper subsume these multiple and sometimes contradictory uses of seriality under their regime of production. As Gilles Deleuze wrote in his preface to *Difference and Repetition* (1968), "modern life is such that confronted with the most mechanical, the most stereotypical repetitions, we endlessly extract little differences, variations and modifications." [5]

Jean-Paul Sartre employed the concept of seriality to model an individual's relationship to aggregable group formations in *Critique of Dialectical Reason* (1960). For Sartre, seriality is a condition of modernity describing individual disempowerment. He uses this model to build a kind of proto-network theory, arguing that urban and industrial life simultaneously isolates individuals while forcing them into group arrangements. The act of reading the newspaper while waiting for the bus was Sartre's principal example. He paints a portrait of the man in the grey flannel suit who waits for the bus every day with his fellow commuters: "their acts of waiting are not a communal fact, but are lived separately as identical instances of the same act." [6] Despite these overarching patterns, the individual does not necessarily perceive his or her waiting as part of a series or network (to become aware of this system of organization would be a step towards collective empowerment). The serial condition emerges when these simultaneous instances are "lived separately" and when each individual is generally unaware of how her actions are part of a larger system. Sartre critiques the way in which modern life is composed of these serial operations. Our inability to grasp the relationship between these generalized abstractions and our status as Othered objects is how, for Sartre, seriality produces urban alienation.

The kind of anomistic repetition Sartre saw as a defining element of modernity can be compared with certain forms of gameplay. Videogames operate as an ideal medium for expressing as well as critiquing the serial structures that define both software environments as well as the quotidian repetition that conducts the rhythm of human existence. In a contemporary context, the man holding a newspaper while waiting for the bus or train has been at least partially replaced by the man fiddling with a smartphone, e-book, or handheld videogame console. Sartre identified the irony of reading a newspaper – a medium designed to foster collectivity and participation within the imagined community of the nation – as a means to create a mental and material barrier from fellow commuters. As Sartre writes, "[t]hese are often *operations* for making the transition from one group to another (from the intimacy of the family to the public life of the office)" and "to isolate oneself by reading the paper is to make use of the national collectivity and, ultimately, the totality of living human beings...in order to separate oneself from the hundred people who are waiting for or using the same vehicle" (emphasis original). [7] Writing in an era prior to the emergence of digital, global networks, Sartre grasped the paradox of serial operations and their capacity to simultaneously assure an individual's segregation in the very moment of feeding him or her into a network.

Sartre's critique of seriality resonates with contemporary theories of networked technology. In *Alone Together: Why We Expect More from Technology and Less from Each Other* (2011), Sherry Turkle argues that computer-mediated social interactions threaten to supplant rather than enhance community engagement. [8] Steven Shaviro echoes Turkle's criticism of networks, writing: "[i]ndeed, our being each alone, rigidly separated from one another, is a necessary condition for our being able to log on to the same network." [9] Smartphones, handheld games, and other networked and portable electronics play a similar contradictory role that newspapers once did, but on a scale that goes well beyond technology as a means of avoiding the eye-contact of adjacent commuters. The legacy of Sartre's search for lines of flight from the serial conditions of industrial life reverberates throughout new media theory and the current search for methods of dispelling network anxiety and solving the problem of being "alone together."

Within the home, game consoles made by companies like Atari, Nintendo, Sega, and Sony over the past four decades have created an architecture that reinforces serialized isolation, with each moment of play "lived separately as identical instances of the same act." [10] The work of game designers often obscures the explicitly repetitive aspects of computational media through the clever rearrangement of both graphic and procedural elements (e.g., basic level design) and the addition of mechanical constraints like time limits, collectibles, and other obstacles. Since *Pac-Man* (1980) and *Donkey Kong* (1981), two of the first games to incorporate animated cutscenes, videogames have borrowed film-making techniques to camouflage

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

serial processes and promote fantasies of immersivity. Pre-rendered cutscenes, motion capture, voice acting, customizable avatars, and symphonic soundtracks further nuance and differentiate one in-game moment from the next. Writing on Bethesda's *Fallout 3* (2008), a cinematic *tour de force* featuring an expansive, branching narrative and opening with a voice-over by Liam Neeson, Tom Bissell notes, "[t]he pleasures of the open-world game are ample, complicated, and intensely private...Because of the freedom they grant gamers, the narrative- and mission-generating manner in which they reward exploration, and their convincing illusion of endlessness, the best open-world games tend to become leisure-time-eating viruses." [11] This freedom is ultimately procedural and the sense of privacy is a fragile form of serial bliss whose bubble is easily burst when multiple players' experience of the same game are juxtaposed. The phenomenology of serial play requires complicity on the part of the player in her own deception. The sudden realization that one's circumstances are part of an ineffable network in which countless others participate, disrupts the serialized isolation on which games like *Fallout 3* and even *Super Mario Bros.* depend. From the minor jolt of arriving at a party to find another guest wearing the same brand name dress to the major shock of the Pacific Trash Vortex, these moments of recognition provide networked antidotes to serial stupor.

In arcades, scoring systems and the physical proximity of cabinets suggest the possibility that players belong to much larger group formations that transcend individual instances of play. Inscription technologies like videocassette documentation, mail-order fan clubs, and even tip hotlines offer traces of a social history that is not rendered within the rules of any videogame. Though a culture of play and unique metagaming practices can form around in-game environments like Level 1-1 from *Super Mario Bros.*, there is no evidence of past plays recorded within the gamespace itself, no footprints left behind by previous Marios. Even save states and passcodes are technically ahistorical, fatalistically encoded before any hand ever clasped a controller. In *Mega Man 2*, for example, punching in "A5, B2, D5, B1, B3, E4, E5, D3, C4" does not call up a transcription of a unique playthrough. There is no record preserving the twists and turns a player might take. Instead, the save state is a generality, standing in as a placeholder for the totality of all actual and possible plays that led up to a particular point. In this respect, videogames model a history without causality, as the codes, passwords, and other in-game inscriptions are nothing more than indices that unlock pre-programmed parameters. Like *Hundred Thousand Billion Poems*, there is nothing truly generative about these works. Queneau's book does not *write* poems, but allows for recombinations of pre-written strings, determined long before a reader ever selected a particular arrangement.

Unlike the pre-set histories of save states and passcodes, the communal and social aspects of play cannot be reduced to (only influenced by) serial machinations. The pre-networked arcade culture has now been emulated and encoded for individual consumption by Valve's Steam (2003), Microsoft's Xbox Live Arcade (2004), Nintendo's Virtual Console (2006), and Sony's PlayStation Store (2006). Within these systems, virtual hubs, public score boards, and community achievements attempt to account for serial phenomena by collecting and visualizing player data. Following the creation of these networked platforms, game development and gaming practices have begun, by necessity, to explicitly engage the serial structures that compose videogames.

Whither Mario?

Much of the software that follows shares thematic, mechanic, and historical references to Nintendo's mascot. The *Super Mario* games serve as Nintendo's flagship series and Mario is the most iconic figure associated with videogames. Mario is so widely known that a director at Nintendo once famously claimed the Italian plumber to be more recognizable than Mickey Mouse among American school children. [12] The *Mario* games are often marketed as launch titles or bundled with hardware to demonstrate the technical capabilities of Nintendo's latest console, recycling the story of a plumber who rescues a princess that is eternally being kidnapped. This formulaic abduction cycle is the means of displaying Nintendo's vanguard technology. Fueled by nostalgia and reliable game mechanics, the Mario series has also become a popular vehicle for metagaming practices.

Alongside the original *Super Mario Bros.* trilogy [13] on the Nintendo Entertainment System (NES) and the ever expanding *Super Mario Land, World, Sunshine,* and *Galaxy* titles on later consoles, [14] there are now a host of player-created variations that circulate on the Internet. Beyond simply building modifications or "mods" using classic Mario game engines or completing Mario games in record times, these experimental gaming practices stretch Mario to his limits. There have been "Mario Quadruns," in which the first four Super Mario titles are played simultaneously and "Mario Mashups" starring Mario in other 8-bit era videogames. There are "Mario Speedruns" exploiting glitches to complete games in seconds while "Infinite Mario," a Java application featuring randomly generated levels, stretches out as far as the thumb can play. Dozens of automatic "Mario Sequencers" convert custom *Super Mario World* levels into j-pop beat machines, [15] automatically propelling Mario across each level like the proverbial bouncing ball set to synthesized music while "Asshole Mario" mods make it difficult for the player to do anything at all. Finally, there is "Quantum Mario," an emulator used to explain the Everett-Wheeler "Many Worlds Interpretation" of quantum physics and "Mario AI" competitions have been held at the Ph.D. level since 2009 in many computer science departments. Even Cory Arcangel's *Super Mario Clouds* (2002), one of the first game mods exhibited in the Whitney Museum of American Art, modifies *Super Mario Bros.*, evacuating the game of all content except the blue, monochromatic sky and a few blocky, leftward floating cloudforms. From remakes of ROM hacks to speedruns of sequencers, Mario has been manipulated, duplicated, generated, appropriated, and aggregated. These metagaming practices have developed as players grow bored with standard challenges and begin to "game" the limits of the software itself.

SINGLE INPUT, MULTIPLE OUTPUT

Multi-Game Tool-Assisted Speedruns

Since the infinitely repeating, score-based worlds of arcade gaming to the more intimate experiences of home consoles, speedruns were one of the first metagames. Unlike vanilla runs or "speed demos," tool-assisted speedruns allow for slow-motion key logging, instant replay, re-sequencing, and even artificially intelligent agents to produce superhuman play. The first tool-assisted speedruns (TAS) appeared in the 1990s after advancements in open-source software enabled *Doom* (1993) players to program playthroughs or "build runs" which could be autonomously executed by computers (no player neccesary). After YouTube was founded in 2005, an eleven-minute speedrun of *Super Mario Bros. 3* (1992) by a user named Morimoto and a sequence of increasingly faster *Super Mario 64* (1996) playthroughs were circulated widely. Initially many believed these videos documented an unassisted player executing in-game maneuvers with shockingly robotic accuracy. Based on the YouTube comments at the time, viewers felt hoodwinked after it was made clear that recording and time-manipulation tools were used to produce these

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

runs frame by frame. Since these early years, tool-assisted speedruns have become an established and respected form of play amongst dedicated gamers. Originally created for entertainment and amusement, there are now metagaming competitions that have grown around the practice. Tool-assisted speedruns have even begun to function as a kind of historical documentation, allowing viewers to watch older or obsolete games completed in record times.

As a way of adding further constraints and increasing the challenge of producing speedruns, multi-game speedruns have been developed to illustrate how a single series of button presses can serve as the input for multiple games. [16] This direction was pioneered by a particular set of tool-assisted speedruns published on TASVideos.org created by Sean "DeHackEd" P., Lennart "Baxter" W., and Yashar "AngerFist" Nasirian. Inspired by DeHackEd's dual-boxing mashup of *Mega Man X* and *Mega Man X2* in 2005, Baxter and AngerFist produced another multi-game TAS in 2007 which featured *Mega Man 3, Mega Man 4, Mega Man 5*, and *Mega Man 6* being played at the same time. AngerFist went on to successfully multi-game the first six Mega Man titles in 2010, the first documented "hex-run," and is currently working sequencing nine games. Similarly, a "quadrun" in which *Super Mario Bros. 1, 2, 3,* and *Super Mario Bros.: Lost Levels* (1986) are played concurrently using one controller was recently submitted to TASVideo.org by agawaf after almost two years of production (Fig. 2). The scale and range of player activities occurring simultaneously in this multi-game TAS is visually reminiscent of Nintendo's four-player *New Super Mario Bros. Wii* (2009) which translates classic Mario gameplay to a multi-player environment. Instead of the controlled chaos of games designed to support multiple players at once, each multi-game TAS requires lockstep precision as any wrong move produces not one, but many game overs. Although each videogame was originally created for an audience of anxious, twitching fingers to test coordination and reflexes, when played simultaneously the games morph into an elaborate, interlocking puzzle. Each gesture, whether manual or programmed, must be executed in a way that takes in to consideration not only the current on-screen action, but the ramifications of those commands within parallel worlds.

In multi-game TAS, the serial logic of videogames is made manifest. [17] While on the one hand, such videos demonstrate the mastery of the player or programmer or filmmaker, on the other hand they expose the interchangeability between games. As TASVideos.org states "Baxter and AngerFist prove that Capcom really has been making the same game over and over again by playing *Mega Man 3, 4, 5* and *6* using the same input." [18] The serialization of *Mega Man* is both a product of corporate franchising and recycled code. For example, Mega Man's basic abilities – run, jump, and shoot – have not changed in the ten iterations of the classic series built between 1987 and 2010. The static source code of all *Mega Man* games and the embodied memory required to succeed in challenges tuned to the franchise's mechanics are dependent on modularity and repetition. These multi-game TAS videos do not only show virtuosic displays of machinic precision, but they also reveal the patterns that migrate from game to game. By expressing the fundamental similarity between these games, the TAS runs and multi-game mashups explicitly demonstrate how there is more than a conceptual or aesthetic family resemblance, but a structural correspondence that exists on the level of platform and code. Despite the similarities, only a limited number of games have been completed simultaneously. These runs might evolve to include larger numbers of games and perhaps more disparate types of gameplay. Like the fabled "theory of everything" in popular physics, there could exist input sequences which succesfully complete every videogame ever made (and ever will be made) simultaneously. [19]

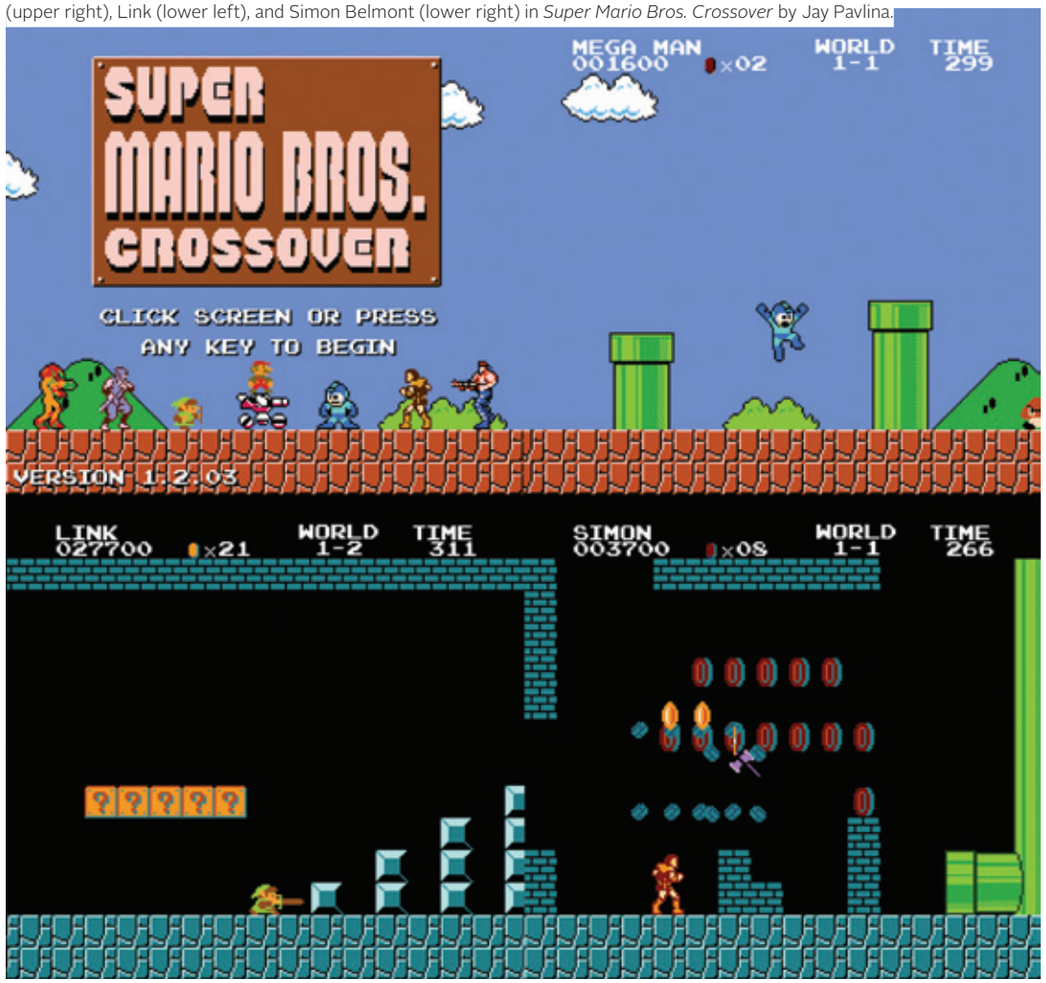
ISSN 1071-4391 ISBN 978-1-906897-16-1

Game Mechanic Mashups and Remixing Code

Within the last ten years numerous mixups and mashups have been programmed which collage and conflate one or more previously discrete videogames. Although these new mashups do not explicitly allow players to control multiple games at once as with multi-game tool-assisted speedruns, the recombinations of familiar game mechanics inspire gameplay strategies which resemble the cognitive multitasking prompted by multi-game TAS. For example, rather than playing *Pac-Man* and *Space Invaders* (1978) at the same time, Pac-Man might be a playable character within *Space Invaders*. Steven Shaviro suggests that "[s]ampling is the best way, and perhaps the only way for art to come to terms with a world of brand names, corporate logos, and simulacra." [20] These mashed-up games participate in the ubiquitous sampling culture that has become a dominant aesthetic strategy of the twenty-first century. In some instances, corporations have attempted to capitalize on the mashup as a marketing gimmick by promoting crossovers between videogame franchises, but within fan communities, amateur programmers produce far more complex forms of recombination which not only remix visual and auditory cues, but game mechanics themselves. [21]

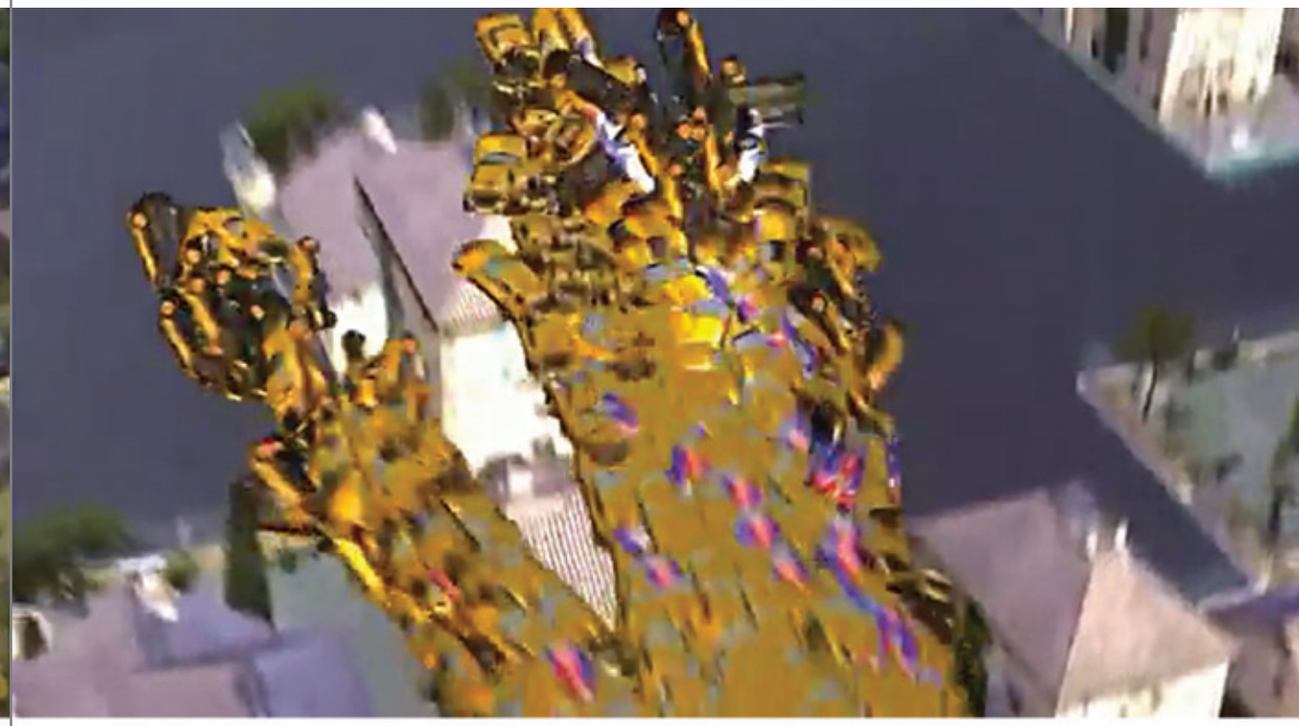
Not surprisingly, Mario is one of the most appropriated characters in player-designed mashups. Both *Grand Unified Game* (2002) by Andy Weir and *ROM CHECK FAIL* (2008) by Farbs place Mario within the context of other arcade classics while games like *Mario vs. Airman* (2008) and *Tuper Tario Tros.* (2009)

Figure 3. The new title screen and screenshots from the first level of *Super Mario Bros.* featuring Mega Man (upper right), Link (lower left), and Simon Belmont (lower right) in *Super Mario Bros. Crossover* by Jay Pavlina.



ISSN 1071-4391 ISBN 978-1-906897-16-1

ARTICLE



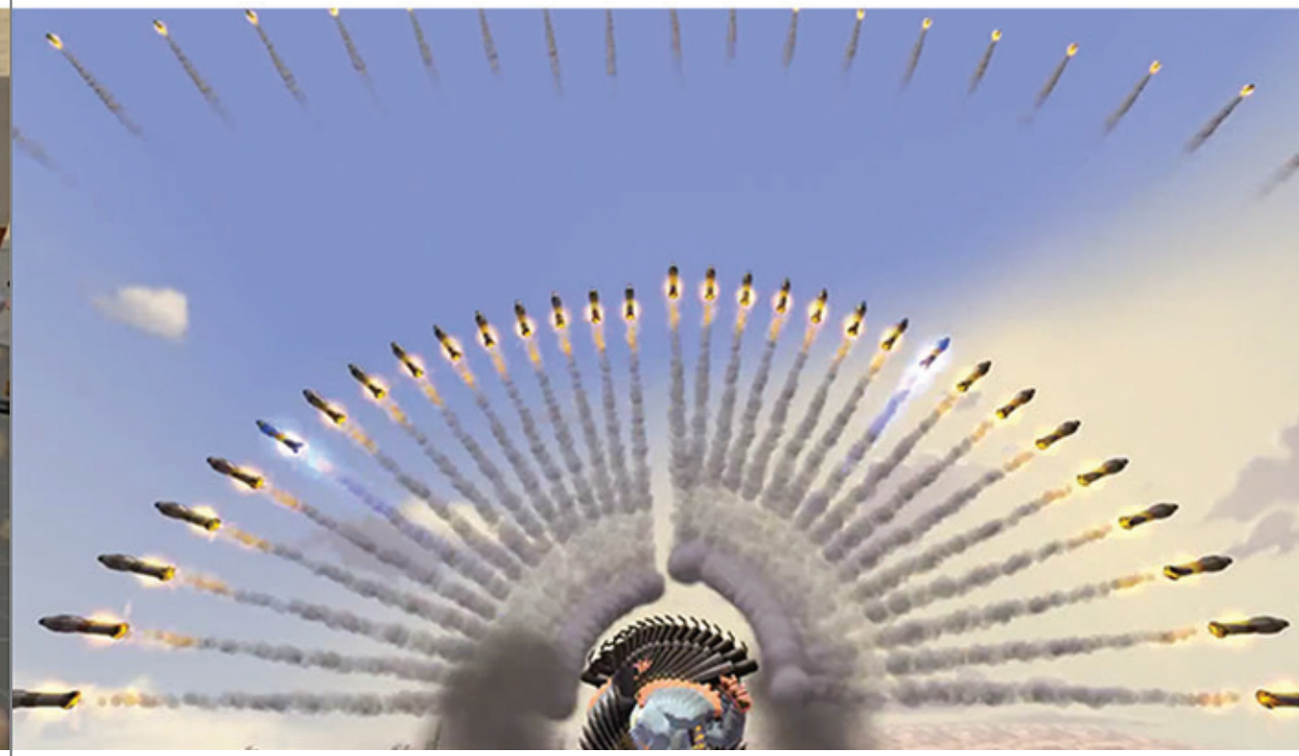


Figure 4. Massive artificial intelligence resembles fluid dynamics in Blackshark and Amraphent's "The 1K Project II" made with *Trackmania* (above) and reveals geometric patterns in the USK Clan's "USK Mass Bots" made with *Team Fortress 2* (below)

 ISSN 1071-4391 ISBN 978-1-906897-16-1

ISSN 1071-4391 ISBN 978-1-906897-16-1

blend *Super Mario Bros.* with other well known NES-era titles (*Mega Man* and *Tetris*, respectively). Most recently, in his carefully constructed Flash game, *Super Mario Bros. Crossover* (2010), Jay Pavlina satisfies the commonly held desire of navigating *Super Mario Bros.* with a wide array of beloved 8-bit videogame protagonists complete with their native graphics, sound effects, and mechanics (Fig. 3). The selection of visiting characters include Link from *The Legend of Zelda* (1986), Samus from *Metroid* (1986), Bill Rizer from *Contra* (1987), Ryu Hayabusa from *Ninja Gaiden* (1988), Sophia the 3rd from *Blaster Master* (1988), Simon Belmont from *Castlevania 2: Simon's Quest* (1990), Mega Man from *Mega Man 4* (1991), and, as a default, Mario himself. Selecting Mario renders a Flash equivalent of the original *Super Mario Bros.* recrafted level for level in order to simulate the original game-space. Regarding these crossovers, blogger Henry Gilbert gushes, "[w]hy stomp a Goomba when you can hit him with a Mega Buster or boomerang? Why break bricks with a jump when you can throw an axe and destroy them all? It all works so well even though it really shouldn't." [22] Through each recombination, *Super Mario Bros. Crossover* challenges the user to micromanage the mechanics of multiple franchises, rewarding those players who match the strengths of other games' protagonists with specific level design in *Super Mario Bros.* [23]

Figure 5. Composited playthroughs in *Super Mario World* (above) and *Kaizo Mario World* (below) produced by Andrew McClure's Many Worlds Emulator.

ISSN 1071-4391 ISBN 978-1-906897-16-1

This interaction between multiple videogame franchises can be seen as part of a phenomenon Marc Steinberg has termed "new seriality." Whereas Sartre's model of seriality corresponded to mechanical and static forms of repetition and industrial production, the new seriality "corresponds to the information-capitalist model" which "has no origin and proliferates through metamorphosis and translation." [24] Steinberg adds that this leads to "a mode of consumption which is itself serial: a character is consumed in its many object forms, as pieces of a constantly expanding universe." [25] Mario's branding follows this logic. Nintendo's mascot is an infinitely renewable resource whose potency lies not in scarcity, but through its multiplication and cross-pollination in numerous projects and media experiments. Integral to this process is not only Mario's transmediality, but also the interaction of this franchise with other franchises exemplified by works such as *Super Mario Bros. Crossover*. The mutations and transformations that occur by placing these series in relation to each other only further activates Mario's proliferation and brand power.

The metagames we have discussed so far in this essay are primarily designed for an audience of proficient players well-versed in the conventions of computer gaming. Each of these mashups not only diegetically combine distinct and disparate games, but they also import the game mechanics, repurposing the operations of one character in a way that was not originally intended. These game mashups employ what Ian Bogost has described as a "unit operational" approach to videogame design. He defines unit operations as "modes of meaning making that privilege discrete, disconnected actions over deterministic, progressive systems." [26] Unit operations are contrasted with the operations of "systems," which are closed and totalized, characterized by "stability linearity, universalism and permanence." [27] While the two are not mutually exclusive, he sees one as an approach to the world that acknowledges the complexity of design and allows for the interaction between various units to have transformative effects. Bogost does not offer an ontological description of unit operations or describe their material structures but concentrates instead on developing unit operations as an approach towards media criticism and practice. In the examples we have collected, the player-programmers have found a way to engage in a critical practice expressed through the medium of software itself. What appears to be the basic driving force of these games, what Bogost would call their unit operational characteristics, is the self-reflexive use of repetition, modularity, simultaneity, and succession. Designers and players have constructed works which have transformative effects over their serial operations. These metagames are not designed to generate revenue, but focus instead on making arguments about the relationship between players and games. The videogames behave as units that can be broken down further into other units – dissected, appropriated, and multiplied. They traverse the discursive and diegetic contexts drawn by the conventions of programming and intellectual property laws. [28]

MULTIPLE INPUT, SINGLE OUTPUT

Many Worlds Emulation and Massive Artificial Intelligence

As shown in the tool-assisted speedruns and game mechanics mashups discussed earlier, tenacious player-programmers have found alternative ways to explore games by extending play through metagaming practices. A relatively new procedure called massive artificial intelligence (mass AI) is a player-designed rendering technique that collects the individual performances of separate players or bots and composites them into one game environment. Rather than suggest the invariant singularity of digital data, videos produced with games like *Team Fortress 2* and *Trackmania* use mass AI to create crowds of thousands of bots executing a multitude of actions in-game. These crowd simulations range from the surreal layering of hundreds of moving images, to domino-like chain events, to granular fluid dynamics (Fig. 4). By layering thousands of mechanically-mediated playthroughs,

ISSN 1071-4391 ISBN 978-1-906897-16-1

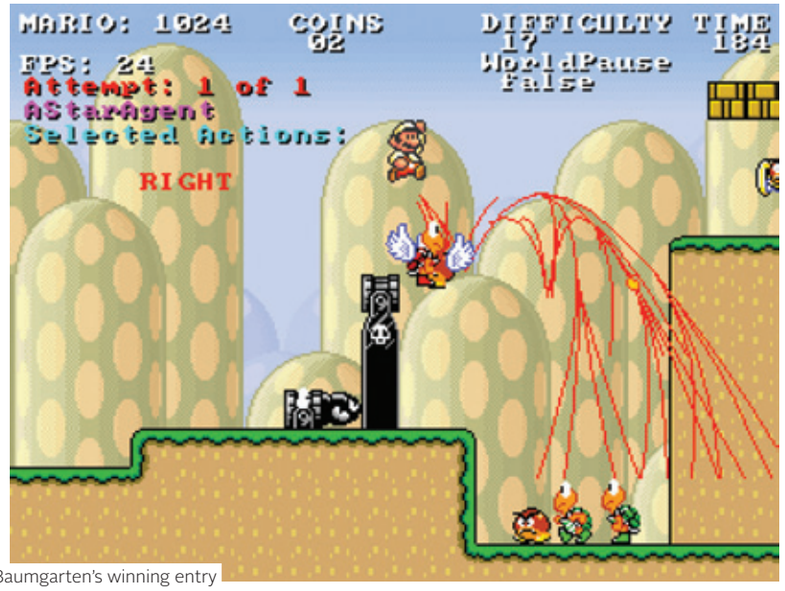


Figure 6. Screenshot of Robin Baumgarten's winning entry from Mario AI Competition 2009.

rendering experiments like mass AI implicitly invoke the serial conditions under which all games are played. The once-anomistic, individualized activities are collectively visualized.

In a *Popular Science* article titled "The Super Mario Multiverse," Abby Seiff gives a lesson in basic quantum theory using a video created with Andrew McClure's Many Worlds Emulator in which "134 overlaid playthroughs represent the manifold possibilities Mario encounters as he progresses through his world." [29] The Many Worlds Emulator was published in response to video documentation of players attempting to complete the unreasonably difficult *Kaizo Mario World*, which roughly translates from Japanese to *Hack Mario World*. According to McClure, "*Kaizo Mario World* is one of a series of ROM hacks people created in special level editors that let you take *Super Mario World* and rearrange all the blocks; the point of Kaizo appears to have been to create *the most evil Super Mario World hack ever*" (emphasis original). [30] Given the difficulty of this particular ROM hack, affectionately referred to as "Asshole Mario," most playthroughs of *Kaizo Mario World* rely on an emulator's ability to save and load game states in order to redo a single section until it is properly executed. Thus, in order to complete the game each second must be replayed over and over "Steve Reich style." [31] To make the Many World Emulator McClure adapted the SNES9X emulator to composite the replays rather than erase them when the player rewinds. As opposed to a flawless playthrough with all of the failed attempts scrubbed out, McClure's emulator incorporates these blunders into the final build run (Fig. 5). As he writes "what makes Kaizo great is watching someone fail over and over and over again until they finally get it right." [32]

Another manifestation of "quantum Mario" appears in Sergey Karakovskiy and Julian Togelius' Mario AI competitions, hosted annually at various computer science conferences including EvoStar, World Congress on Computational Intelligence (WCCI), and the Institute of Electrical and Electronics Engineers Conference on Computational Intelligence in Games (IEEE-CIG). Using Markus Persson's *Infinite Mario Bros.* (2006), a java application which generates random levels based on the gameplay mechanics of *Super Mario Bros. 3* with the sprite-based graphics of *Super Mario World*, [33] Karakovskiy and Togelius invite ROM hackers and AI researches alike to compete by programming Mario to traverse Persson's infinite terrain. In 2009, Robin Baumgarten achieved minor celebrity with his elegant solution based on the A* Algorithm, a pathfinding heuristic using the best-first search. [34] Alongside a zipping, seemingly infallible Mario, Baumgarten's algorithm renders webs of red pixel vectors – tendrilized feelers shooting out in front of the plumber, cataloging every possible path second to second (Fig. 6).

Instead of executing the game in a discrete, sequential order, these examples convert the player's labor into a visual cacophony as hundreds of Marios simultaneously follow all possible paths as they traverse a level. McClure sees this "Mario cloud" as an emblem for the multiplicity of potential action suggested by the many-worlds interpretation of quantum mechanics. In the Many Worlds Emulator, the struggles of one hundred playthroughs are collaged within the same frame. These renderings produce a cubist-like overlaying of temporalities as the real and the possible converge and invite the player to imagine how their own actions fit into a pattern of wave-particle duality – their individual choices represented as both unique events and part of a larger system of relations. Whereas Sartrean seriality describes the relationship of individuals to groups, this pop-physics example of the many-worlds interpretation frames a self in relationship not to other selves, but to a cloud of all possible versions of the self.

Recording and Playback in Videogames

The seriality of a player's performance, both imaginary and actual, has been incorporated into new forms of gameplay that figure button presses as probabilities within a much larger set of aggregate actions. For example, an emerging genre of self-cooperative gameplay involves recording a player's actions for a limited time and then simulates a multiplayer environment by replaying the combined actions of a limited number of previous playthroughs. These multiple recordings – or past lives – do not function simply as ghosts visualizing past plays but perform real-time actions necessary for further exploration of the game (e.g., holding a door open for future navigation). Self-cooperative gameplay was popularized by *Cursor*10* by Yoshio Ishii of Nekogames and has proliferated in other Flash applications like *A Good Hunch* (2007-8), *Timebot* (2007), and *Chronotron* (2008) as well as in a games for more advanced platforms including *Braid* (2008), *Onore no Shinzuru Michi wo Yuke* (2009), *Time Donkey* (2009), *Ratchet and Clank: A Crack in Time* (2009), *The Misadventures of P.B. Winterbottom* (2010), and *Ecoshift* (2010). This kind of cumulative replay resembles the production techniques of audio engineering in which one musician or voice actor performs alongside multiple past recordings of herself. Most videogames have traditionally forced multiple playthroughs as either punishment for mistakes or to

Figure 7. In Nintendo's *Super Mario Galaxy 2*, the player must self-compete with a series of shadowy doppelgangers.

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

elongate playtime, but in self-cooperative games both filmic and ludic layering rely on cumulative results which arise from the interactions between pre-recorded playthroughs as space and time are populated. While playing within a crowd of past actions and acting with future outcomes in mind, players must navigate the strange effects of stacked, serialized aggregations.

Alternatively, this mechanic is sometimes used self-competitively rather than self-cooperatively as seen in *The Road Less Taken* (2007), *DefeatMe* (2009), and, most recently, *Super Mario Galaxy 2* (2010). In *Super Mario Galaxy 2*, the player's actions are sometimes replicated by multiple shadow Marios that propagate endlessly and force one to navigate the level while avoiding an array of doppelgängers tailing behind. In a way, the multiple uses of the recording and playback in videogames historicize play itself as the game mechanic, if only fleetingly, records traces of player movement.

A second case of serial playback and recording outside of designed game mechanics can be found in certain approaches to artificial intelligence programming for speedruns. Though the programming results in a clean runthrough, the process of rendering each video requires recording and playback effects not unlike the rewinding and fast forwarding in *Braid* or *Prince of Persia: The Sands of Time* (2003). In one example programmed and exhibited on YouTube by ashland-withouttheshd, a Greedy Best-First algorithm searches the 8-bit Mushroom Kingdom for the optimal path while Mario, used as a kind of finicky cursor, is only allowed to run free for fractions of a second before the search chokes back. Scrubbing back and forth, the in-game timer jittering between "354" and "355," Mario might make five or six attempts to jump over the first pit in *Super Mario Bros.* This nervous bot, unsure of what is approaching, uses mid-level save states and resets constantly, playing the same few paces over and over until the Greedy Best-First search is satisfied. Dying time after time, Mario stumbles forward until the level is complete, rendering a perfect playback. The final seamless runthrough is a composite video totaling hundreds of small decisions typically taken for granted when playing a game. A spatial indexing of *Super Mario Bros.* reveals a dense web of possibilities, a surplus eclipsed by smooth playback.

Watching metagames like tool-assisted speedruns, particularly those that exploit glitches and holes or make use of AI, feels very different from regular gameplay. The psychedelic gymnastics necessary to complete games in record time sacrifice the human qualities of ludic action. While these runs proffer the fantasy of the perfect play, they also suggest that this fantasy can only be realized through a process of becoming-machine. In the case of AI runs, the human player is removed entirely, resulting in a computer that plays itself. [35]

CONCLUSION

Jane McGonigal's new book *Reality is Broken: Why Games Make Us Better and How They Can Change the World* (2011) opens with a manifesto-like celebration of the serial effects of networked culture. In a frequently-cited passage of the book, McGonigal claims that "if you add up all the hours that gamers across the globe have spent playing *World of Warcraft* since the massively multiplayer online (MMO) role-playing game (RPG) first launched in 2004, you get a grand total of just over 50 billion collective hours – or 5.93 million years." [36] While these numbers may be awe-inspiring – there are no doubt hundreds of thousands of millions of hours invested in gaming platforms like *World of Warcraft* – the rhetorical potency of McGonigal's figures rely on a misrepresentation of seriality. Why characterize years of collective action involving millions of players as a singular duration instead of, for example, a rate like 20 hours a week per player? When compared to the finite life of the reader, McGonigal's 5.93 million years appears sublime and beyond measure, but relative to the serial processes of collective life, the statistic falls flat. Using the same logic McGonigal applies to *World of Warcraft,* one could say that the 7 billion humans on earth collectively live 19 million years *every day.*

Further compounding this confusion, McGonigal proposes a homology between time spent playing *World of Warcraft* and the process of human evolution. "5.93 million years ago is almost exactly the moment in history that our earliest human ancestors first stood upright," she writes, and "[b]y that measure, we've spent as much time playing *World of Warcraft* as we've spent evolving as a species." [37] In order to demonstrate the power of network phenomena and render these operations legible, McGonigal treats human evolution as an unbroken and linear flow of time and translates the synchronic actions of the multitude onto a diachronic timescale. But evolution is not a single-player game. Technically, if one were to make an equivalency comparing the total playing time in *World of Warcraft* to the total time humans have spent living on earth, McGonigal's original 5.93 million year timeline would have to be multiplied by the average size of the human population at each moment of that history producing a number that far exceeds all but a mathematical understanding of scale.

There is another assumption implicit in McGonigal's suggestion that somehow 'evolving' from level one to eighty-five is co-terminous with the progress from bipedalism to the present. Her analogy is underwritten by a fixed concept of the human and the assumption that human agency is the dominant contributing factor in the evolution of a species. But there is no singular, unbroken human lineage that can traced back to the Paleolithic Period. Evolution is the product of a complex interweaving of environmental, genetic, linguistic, and economic factors (including the playing of *World of Warcraft*) that contribute not to the flow of species, but to what Manuel De Landa might describe as a serial "flow of biomass through foodwebs as well as the flow of genes through generations" over a thousand years of nonlinear history. [38] The desire for a monolithic and totalizing metaphor for network activity is constantly thwarted by the units within the network model itself – the complex assemblages of mechanical, electrical, and computational processes that can never be fully reduced to the time-space of an individual human subject. This bit-wise approach is echoed by Ian Bogost when he writes in *Unit Operations*: "[t]he Internet, the brain, human genetics, and social fads are examples of complex, unit-driven networks." [39]

In "Cybernetics and Ghosts" Italo Calvino notes the similarities between *Hundred Thousand Billion Poems*, the game of chess, and the "electronic brain," writing, "[j]ust as no chess player will ever live long enough to exhaust all the combinations of possible moves for the thirty-two pieces on the chessboard, so we know (given the fact that our minds are chessboards with hundreds of billions of pieces) that not even in a lifetime lasting as long as the universe would one ever manage to make all possible plays." [40] Encountering every poetic, programmatic, or neural combination is impossible, and yet it is exactly those hidden patterns and unconscious repetitions that serial games explore. Thus, like readers, computer game enthusiasts engage in vast networks of patterns that make up the aggregate histories of virtual worlds. But rather than remaining subject to the mechanisms of control as defined by the rules of the game, the modifications, alternative practices, player actions, and histories of gamespaces explored in this essay successfully metagame the serial constructs players are working within and against to model the movements of a hundred thousand billion fingers. ■

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

REFERENCES AND NOTES

1. Since 1985 the *Super Mario Bros.* videogame has sold over 40 million copies worldwide while the Mario franchise as a whole has sold more than 152 million copies total. "Best-Selling Video Games," *Guinness World Records,* http://web.archive.org/web/20060317005503/http://www.guinnessworldrecords.com/content_pages/record.asp?recordid=52404 (accessed April 12, 2011).
2. For further discussion of the relationship between the Oulipo and digital media, see Noah Wardrip-Fruin and Nick Montfort, eds., *The New Media Reader* (Cambridge, Mass: The MIT Press, 2003), 147-94.
3. The Nintendo Entertainment System receives input from the controller at a specific number of samples per second. Thus, every button press is registered along a discrete and linear timeline which enables "build runs" and "speed demos" to be programmed sequentially, piece by piece.
4. Mary Flanagan, *Critical Play: Radical Game Design* (Cambridge: The MIT Press, 2009), 4, 6.
5. Seriality was a foundational concept for both Deleuze and Jean Baudrillard who developed the concept in their dissertations that were later published as *Difference and Repetition* (1968) and *The System of Objects* (1968), respectively. Gilles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994), xix.
6. Jean-Paul Sartre, *Critique of Dialectical Reason* (New York: Verso, 2004), 262.
7. Ibid. 257–8.
8. Sherry Turkle, *Alone Together: Why We Expect More from Technology and Less from Each Other* (New York: Basic Books, 2011).
9. Steven Shaviro, *Connected, or, What It Means to Live in the Network Society* (Minneapolis: University of Minnesota Press, 2003), 29.
10. Sartre, 262.
11. Tom Bissell, *Extra Lives: Why Video Games Matter* (New York: Pantheon Books, 2010), 4.
12. Kōichi Iwabuchi, *Recentering Globalization* (Durham: Duke University Press, 2002), 30.
13. The second installment of this Mario trilogy differs depending on region. *Super Mario Bros. 2* (1986) did not appear in the West until its release on Wii's Virtual Console in 2007 (though it was remade with updated graphics as *Super Mario Bros.: The Lost Levels* as part of *Super Mario All-Stars* in 1993). Instead, another Miyamoto title, *Yume Kōjō: Doki Doki Panic* (1987), was re-skinned with Mario-themed graphics and released as *Super Mario Bros. 2* (1988) in Europe and the United States. In Japan, this title is known as *Super Mario USA*.
14. The plumber made his hand-held debut as a launch title for Nintendo's Game Boy in *Super Mario Land* (1989). Shortly following that success, *Super Mario World* (1990) was packaged with the Super Nintendo Entertainment System (SNES). Though *Mario 64* did not conform to the ever-extending spheres of geographic influence, *Super Mario Sunshine* (2002) continued this trend on Nintendo's GameCube while *Super Mario Galaxy* (2007) and *Super Mario Galaxy 2* (2009) are two of the highest selling titles on the Wii. With the possibility of a *Super Mario Universe* on the horizon, it is becoming more and more difficult to imagine new territories for Mario to colonize. Perhaps the multiple dimensions discussed in this paper offer a temporary solution.
15. J-Pop stands for Japanese Pop, a style of popular music produced in Japan and gaining popularity in the 90s. Other Asian pop genres include K-Pop and C-Pop (produced in Korea and China respectively).
16. As discussed on the TAS Video Forums in May 2005, the multi-game TAS or "Bigame Movie" originated from the idea of executing the same bit of code in both Perl and PostScript computer languages – a kind of code pun not unlike John Cayley's poem *Pressing the "Reveal Code" Key* (1996) which can be read as both natural language and executable code. This idea was also tested by the TAS Video community using strings of button presses from successful speedruns as alternative input for Nintendo's *Pinball* (1984). In this case forum members would compete for the highest score, not by playing *Pinball*, but by seeing which other speedruns produced the highest score when used as input for the game. TAS Videos Forum, "Bigame Movies," *TAS Videos Forum*, http://tasvideos.org/forum/viewtopic.php?t=2385 (accessed April 12, 2011).
    John Cayley, "Pressing the "Reveal Code" Key," *EJournal*, http://www.ucalgary.ca/ejournal/archive/ej-6-1.txt (accessed April 12, 2011).
    TAS Videos Forum, "Crazy idea: NES pinball competition!!! (it's really crazy)," *TAS Videos Forum*, http://tasvideos.org/forum/viewtopic.php?t=1490 (accessed April 12, 2011).
17. Another use of a single input on multiple operations is the practice of multiboxing in massively multiplayer online games (MMOs). In this practice, a single operator controls multiple instances of the same videogame either through a singular input or by juggling multiple controllers as a solution for solo play in MMO environments balanced towards large group play. Multiboxers play anything from two to twenty games simultaneously and in one of the largest documented cases an entire *World of Warcraft* guild of up to forty players and beyond has been operated simultaneously by one player.
18. TAS Videos, "NES Mega Man 3, 4, 5 & 6 (USA) in 39:06.92 by Lennart W. (Baxter) & Yashar Nasirian (AngerFist)," *TAS Videos.* http://tasvideos.org/871M.html (accessed April 12, 2011).
19. The simplest solution to this equation of "everything" would be to string completed speedruns of every each game in a linear order and allow this chain of button presses to function as the input for every game simultaneously. These concatenated speedruns would initially fail to complete those games they were not intended for. So, in order for the compilation to execute properly, this massive string would require buffers of button presses added between each original sequence in order to return the succeeding game to its null state (by achieving a game over). Though this equation would eventually complete every game ever made, it does not have the critical potential that the interwoven (or threaded) speedruns of Lennart W. (Baxter) and Yashar Nasirian (AngerFist) have created.
20. Shaviro, 64.
21. It is important to distinguish between games which mashup mechanics (e.g., code) and games which mashup intellectual property (e.g., characters and storyworlds). Though we are most interested in examples which mashup two or more previously discrete forms of gameplay, there is a large set of videogames which simply conflate the characters and settings of multiple franchises. Sports titles such as Nintendo's *Mario Kart*, *Mario Tennis*, and *Mario Golf* feature the likenesses of famous trademarked characters in new types of gameplay. Fighting games like Namco's *Soulcalibre* and Tecmo's *Dead or Alive*, in addition to games like Nintendo's *Super Smash Brothers*, not only license trademarks from other games but also from films (e.g., *Star Wars*). Capcom's "vs." series makes this marketing strategy most patent by titling each crossover with the names of corporations like *Marvel vs. Capcom* (1998), *SNK vs. Capcom* (2000), and *Tatsunoko vs. Capcom* (2008). Here the obligatory "vs." doubles as a signifier for one-on-one combat as well as the marker of a temporary corporate merger (dramatizing the unease that accompanies strategic corporate alliances). The Disney Corporation, in collaboration with Square-Enix, created another strange, character-driven mashup with *Kingdom Hearts* (2002), an action role-playing game (RPG) featuring both Disney and Square characters underwritten by Square-Enix game mechanics. Though these games might be considered mashups on a thematic level, they do not mashup the mechanics of multiple franchises.
22. Henry Gilbert, "Super Mario Crossover kicks your balls into next week with awesomeness," *GamesRadar,* http://www.gamesradar.com/wii/wii/news/super-mario-crossover-kicks-your-balls-into-next-week-with-awesomeness/a-20100428142237272009/g-20060308165433320026 (accessed April 12, 2011).
23. *Mario vs. Airman* [*sic*] (2008) is a clever ROM hack in which the user controls Mario or Luigi, complete with the familiar control scheme and jump physics of *Super Mario Bros*., to navigate Air Man's famous level from Capcom's *Mega Man 2* (1988). The ROM hack also includes an 8-bit arrangement of *Air Man ga Taosenai* (2007), or *Air Man Will Not Die,* as the game's background music. Like *Mario vs. Airman* [*sic*], *Air Man Will Not Die* is a fan-created

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1

music video featuring an exasperated-yet-determined Mega Man attempting to defeat Air Man, a particularly polarizing character who some fans insist is the most difficult robot master to defeat while others argue the opposite. After hosting a download of the game on her blog antie pixelante, Anna Anthropy commented, "...mashups like this illuminate design trends between games. Mario and megaman share "jump" as a primary verb, which is why it's possible to complete this hack at all." anna anthropy, "mario vs. airman," *auntie pixelante*, http://www.auntiepixelante.com/?p=322 (accessed April 12, 2011).

24. Marc Steinberg, "Characterizing a New Seriality: Murakami Takashi's DOB Project," *Parachute: Contemporary Art Magazine* 110 (April-June 2003): 96.
25. Ibid., 100
26. Ian Bogost, *Unit Operations: An Approach to Videogame Criticism* (Cambridge, Mass: The MIT Press, 2006), 3.
27. Ibid., 6.
28. A work like *ROM CHECK FAIL* could be interpreted as a kind of perverse letting loose of a collective gaming unconscious. The premise of *ROM CHECK FAIL* is that the read-only memory (ROM) of an 8-bit emulator containing a dozen or so classic games has been corrupted causing a sequence of unpredictable videogame mashups. *ROM CHECK FAIL* challenges the player to continue micromanaging the mechanics of multiple franchises, requiring pre-emptive action. This requires the player to manipulate the controller such that she is not only playing those games which are immediately recombined on the screen, but *every* game — an imagined totality of all the other games which she must anticipate in order to succeed. *As Play This Thing!* editor Patrick Dugan notes: "You'll find yourself metagaming, you know that as the Defender jet, you can merc those rainbow cascade things pretty well, but in the process of getting over there, there is a good chance they'll turn into goombas, and you'll get hit. Or maybe you'll hesitate, as Link, to walk up that hallway, because you could become the Space Invaders turret, unable to move vertically, and get caught by pursuing Gauntlet ghosts." Patrick Dugan, "ROM Check Fail: There Is No More Filament," *Play This Thing!*, http://playthisthing.com/rom-check-fail (accessed April 12, 2011).
29. Abby Seiff, "The Super Mario Multiverse," *Popular Science*, http://www.popsci.com/entertainment-gaming/article/2008-03/super-mario-multiverse (accessed April 12, 2011).
30. Andrew McClure, "Super Mario World vs. the Many-Worlds Interpretation of Quantum Physics," *Mechanically Separated Meat*, http://msm.runhello.com/?p=20 (accessed April 12, 2011).
31. Ibid.
32. Ibid.
33. Markus Persson, a Swedish programmer also known as "Notch," would go on to develop the wildly successful sandbox game *Minecraft* (2010), which features randomly generated landscapes constructed out of Lego-like Voxels that can be manipulated by the player. The game is notable for being successfully distributed in a constantly updating alpha version. As a result of this serial format, the players double as play testers and influence the direction the development of the game took.
34. Some contenders suggest Baumgarten ventured beyond the spirit of the rules by integrating the entirety of the *Infinite Mario Bros.* level generator into Mario's AI rather than using the much more limited, default library of functions for addressing "vision." The result of this oversight (on the part of both the organizers and Baumgarten's AI) is that Baumgarten's Mario sees all from a godlike perspective when compared to the restricted viewpoints of the other bots.
35. Both the tool-assisted speedruns as well as Mario AI show how far videogame "demos" have come since *Super Mario Bros.* was first released in 1985. In the original, if a player does not immediately "press start to begin" two demos of the game will loop depicting a computer-controlled Mario navigating Level 1-1. Phil Sandifer has conducted a close reading of the strange and illogical behavior that characterizes Mario's movements in the demo, suggesting that the computer's failure to successfully move through the game indicates how undervalued this type of presentation was at the time: "the demo is not an essential part of learning to play...The game needs an actual player to complete it in a functional and proper way." Sandifer describes the Mario in this video as Player Epsilon. He argues that "[t]he **ε** is the sign, within computer science, of the empty set – that set containing no members. Thus Player **ε** is the player without content – the player that is a player, but with none of the actual traits or aspects of the player. There is, in Player **ε**, only the consequences of the player – game and play – and no actual player. In one sense, then, Player **ε** represents the pure act of play – play without its attachment to the dyad." The development of AI that replaces the human hand with algorithms signals this shift from Mario's early history. If, as Sandifer suggests, the game once operated under the assumption that it held no value for the spectator in the absence of human interaction, the demo (and the machinic subjectivity that he characterizes as Player **ε**) has come to assume a more privileged place. Sandifer, Phil, "Player Epsilon: Demoing a New Hermeneutic for Games," *Proceedings of the 2006 UF Game Studies Conference*, http://www.gameology.org/essays/player_epsilon_demoing_a_new_hermeneutic_for_games (accessed April 12, 2011).
36. Jane McGonigal. *Reality Is Broken: Why Games Make Us Better and How They Can Change the World* (New York: Penguin Press, 2011), 52.
37. Ibid.
38. Manuel De Landa, *A Thousand Years of Nonlinear History* (New York: Zone Books, 1997), 259.
39. Bogost, 8.
40. Italo Calvino, *The Uses of Literature: Essays* (San Diego: Harcourt Brace Jovanovich, 1986), 8–9.

ISSN 1071-4391 ISBN 978-1-906897-16-1
ISSN 1071-4391 ISBN 978-1-906897-16-1