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Ludocapital: The Political Economy of Digital Play

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Comparative Literature

by

Will Gregory Jordan

Dissertation Committee:
Associate Professor Eyal Amiran, Chair
Professor James Steintrager
Professor David Theo Goldberg

2014

DEDICATION

To my parents, who kept us playing and thinking

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ACKNOWLEDGMENTS

CURRICULUM VITAE

Will Gregory Jordan

EDUCATION

Doctor of Philosophy in Comparative Literature	**2014**
University of California, Irvine	*Irvine, CA*
Master of Arts in Comparative Literature	**2008**
University of California, Irvine	*Irvine, CA*
Bachelor of Science in Computer Science & Literature	**2005**
Yale University	*New Haven, CT*

WORK EXPERIENCE

Software Engineer	**2014–**
Code.org	*San Francisco, CA*
Software Engineer	**2010–2012**
ZipZapPlay/PopCap Games	*San Francisco, CA*
Software Engineer	**2007–2010**
Javaground	*Irvine, CA*

TEACHING EXPERIENCE

Instructor, Critical Reading & Rhetoric	**2006–2007**
University of California, Irvine	*Irvine, CA*

CONFERENCE PAPERS

Evolution of the Tetromino-Stacking Game: An Historical Design Study of Tetris	**Sept. 2009** DiGRA 2009
From Rule-Breaking to ROM-Hacking: Theorizing the Computer Game-As-Commodity	**Sept. 2007** DiGRA 2007

ABSTRACT OF THE DISSERTATION

Ludocapital: The Political Economy of Digital Play

By

Will Gregory Jordan

Doctor of Philosophy in Comparative Literature

University of California, Irvine, 2014

Associate Professor Eyal Amiran, Chair

This dissertation is a contribution to a theory of ludocapitalism, understood as
the incorporation of the concept of game-playing into capitalism in contemporary
technoculture. The term is derived from the Latin word *ludus*, meaning *game* or
play. By this compound term, I mean to describe a hybrid or transitional moment
of capitalism that describes its processes of commodity production and capital
accumulation through reference to play as a central concept of human activity and
social organization, superseding the concept of work as the locus of rationality in
traditional capitalist labor formations. Through a (post)humanistic study of the
discourses and practices of software and game development viewed as paradigmatic
instantiations of conditions of ludocapitalism, I develop an approach to engage these
practices in ethical-political discourse derived from the critical theory tradition.

In this dissertation, I relate this dialectic of play to classical discourses of
modernity in order to draw comparisons, contrasts and historical transitions from the
liberal human subject of the Enlightenment to a technoliberal, posthuman subject
prompted by the computerization of society and the expansion of digital play. A
central question of this dissertation is whether and in what modified form traditional

discourses of critical theory can maintain relevance in this techno-ludic context. Through an analysis of the ambiguity of play and creativity in discourses of game design and software development, and as a complement to textual and rhetorical theories of digital media, I advance a critical approach to digital game and software studies, attentive to the ambivalent potential of specific technical-social platforms upon which these new forms of media are constructed, with an aim to advance and reconfigure the conditions of ludocapitalist society toward better sustaining our collective forms of life.

Introduction

This dissertation is a contribution to a theory of *ludocapitalism*, understood as the incorporation of the concept of game-playing into capitalism in contemporary technoculture. The term is derived from the Latin word *ludus*, meaning *game* or *play*. By this compound term, I mean to describe a hybrid or transitional moment of capitalism that describes its processes of commodity production and capital accumulation through reference to play as a central concept of human activity and social organization, superseding the concept of work as the locus of rationality in traditional capitalist labor formations. Through a (post)humanistic study of the discourses and practices of software and game development viewed as paradigmatic instantiations of conditions of ludocapitalism, I develop an approach to engage these practices in ethical-political discourse derived from the critical theory tradition.

In contemporary information society, play is displacing work as the primary mode of capitalist organization. Creativity, construed as a valuable commodity mined from the intangible cultural resources of everyday life, displaces the protestant, modernist work ethic with a playful hacker ethos of the information age. As Wark illustrates in *Gamer Theory*, the celebrated player of digital gaming enthusiastically expands into the contemporary subject of the universal gamification of everyday life, marking a transformation from the labor-leisure distinction within industrial capitalism to the hybrid institutions of ludocapitalism: work-as-play environments structured to accumulate creative capital produced by new classes of professional

knowledge-workers, and play-as-work commodity forms designed to extract surplus social and cultural value from mass entertainment player-consumers. However, the same concept of play that provides contemporary capital its progressive ludic dynamism also preserves a critical potential for disruptive play that can escape and dismantle such fixed constructions. Ludocapitalism deploys a technical infrastructure and social ideology that contains the seeds of its own undoing within the same rhetoric of play that it embraces and depends on for its own progressive survival.

In this dissertation, I relate this dialectic of play to classical discourses of modernity in order to draw comparisons, contrasts and historical transitions from the liberal human subject of the Enlightenment to a technoliberal, posthuman subject prompted by the computerization of society and the expansion of digital play. A central question of this dissertation is whether and in what modified form traditional discourses of critical theory can maintain relevance in this techno-ludic context. Through an analysis of the ambiguity of play and creativity in discourses of game design and software development, and as a complement to textual and rhetorical theories of digital media, I advance a critical approach to digital game and software studies, attentive to the ambivalent potential of specific technical-social platforms upon which these new forms of media are constructed, with an aim to advance and reconfigure the conditions of ludocapitalist society toward better sustaining our collective forms of life.

Subjects and Theories

Before I proceed to outline the specific historical trajectories of this analysis, I will first further define the key theoretical terms and methodological assumptions that comprise my approach. By the *liberal human subject*, I have in mind a broad, familiar constellation of political-economic and social-theoretical positions emerging in the

Enlightenment period that link together liberal concepts of freedom, autonomy and humanity to secular ideals of rational thought, public reason, private ownership, and democratic self-governance. This subject assumed its modern philosophical form starting with Descartes and developed in the German idealism of Kant, Fichte and Hegel, was notably challenged and problematized within Marx's critique of liberal political economy and Adorno and Horkheimer's dialectic of myth and enlightenment, and was decentered within Foucault's poststructuralist dispersion into historically-specific fields of discursive formation. Alongside this familiar sequence of movements in the discourse of subject-formation, I also include Schiller's post-Kantian ideals of game-playing as particularly central to the formation of the liberal human subject in relation to contemporary ludocapitalism, a position I will expand upon in Chapter 1.

For the *posthuman* subject, I look both to Mark Poster's thematic of the mode of information in the context of electronically mediated communication,[1] and to Katherine Hayles's studies of the transformation of the liberal human subject of possessive individualism within the field of cybernetics[2] as my initial two points of departure. However, as neither Hayles nor Poster devote much attention to either digital games or the broader topic of game-playing within their theoretical apparatus, my aim is to extend their theories of digital subjectivity in a way that places them

[1] Poster developed his thematic of the mode of information from the mid 1980s as an extension of Foucault's concept of discourse, within the contemporary context of "new forms of social interaction based on electronic communications devices" (168).

[2] Hayles's analysis of the posthuman in Weiner's cybernetic theory is measured against a liberal humanist subject marked by possessive individualism: "To elucidate the significant shift in underlying assumptions about subjectivity signaled by the posthuman, we can recall one of the definitive texts characterizing the liberal humanist subject: C. B. Macpherson's analysis of possessive individualism. 'Its possessive quality is found in its conception of the individual as essentially the proprietor of his own person or capacities, owing nothing to society for them. . . . The human essence is freedom from the wills of others, and freedom is a function of possession.' The italicized phrases mark convenient points of departure for measuring the distance between the human and the posthuman" (*How We Became Posthuman* 3).

in closer dialog with the field of game studies. For this reason, I prepend the term *technoliberal* to my account of the posthuman under conditions of ludocapitalism. This is a term introduced by Thomas Malaby in *Making Virtual Worlds*, used to indicate emerging cultures of game design that expand the naturalization of market forces in liberal economic theory to a heterogeneous embrace of contrived complex systems throughout all aspects of social life:

> While Adam Smith conceived of a market that was in a way a natural and ineradicable part of the landscape, . . . and neoliberal thought continues to see the market in this way, technoliberalism holds up the idea that such complex systems can be contrived, in their entirety. The liberal component is the imagined freedom of individuals to perform as such within designed systems, generating collective effects that are thereby legitimate. (133)

Finally, my references to "critical theory" specifically invoke the ethical-political[3] orientation of the Frankfurt School tradition, in order to provide a coherent, emancipatory focus to my project that is largely absent within the fields of software and game studies. I understand the term in the restricted sense assigned to it by Horkheimer, summarized by Poster as a discourse that "attempts to promote the project of emancipation by furthering what it understands as the theoretical effort of the critique of domination begun by the Enlightenment and continued by Karl Marx" (*Critical Theory and Poststructuralism* 1). In his 1937 essay "Traditional and Critical Theory," Horkheimer develops the concept of critical theory by distinguishing "two

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[3] While I use the term *ethical-political* in a general sense to refer to the humanistic orientation of critical theory, I also refer in a specific sense to Habermas's concept of a concrete, historically-situated discourse concerning "who we are and who we seriously *want to be*" (*Between Facts and Norms* 180), as an "affirmation of a form of life in light of critically appropriated traditions" (163). Derived from Hegel's *sittlichkeit* (ethical life), Habermas offers a fragmented, less nationalistic concept suitable for partial, overlapping collective identities: "A pluralism in the ways of reading fundamentally ambivalent traditions has sparked a growing number of debates over the collective identities of nations, states, cultures, and other groups. Such discussions make it clear that the disputing parties are expected to consciously choose the continuities they want to live out of, which traditions they want to break off or continue. To the extent that collective identities can develop only in the fragile, dynamic, and fuzzy shape of a decentered, even fragmented public consciousness, *ethical-political discourses* that reach into the depths have become both possible and unavoidable" (97).

ways of knowing: one is based on [Descartes's] Discourse on Method, the other on Marx's critique of political economy" (244). In contrast to the "traditional idea of theory [which] is based on scientific activity as carried on within the division of labor at a particular stage in the latter's development" (197), the idea of theory Horkheimer identifies as "critical"[4] is "a human activity which has society itself for its object" (206):

> Critical thinking is the function neither of the isolated individual nor of a sum-total of individuals. Its subject is rather a definite individual in his real relation to other individuals and groups, in his conflict with a particular class, and, finally, in the resultant web of relationships with the social totality and with nature. The subject is no mathematical point like the ego of bourgeois philosophy; his activity is the construction of the social present. (210–1)

This distinction is central to my own theoretical approach in relation to contemporary fields: throughout this dissertation I firmly position my methodological assumptions, grounded in this form of critical theory, against both those of a social science which would maintain at all costs the rhetorical perspective of an objectively-neutral observer, as well as those of a literary criticism which would dismiss any emancipatory project in favor of techniques of rhetorical analysis or production of meaning within the bounds of established order. The difficult task of preserving this humanist orientation of critical theory and its "concern for reasonable conditions of life" (199) within a positive vision of the posthuman that advances beyond the transcendental assumptions of the modern human subject articulates a concept of "post-humanities" as a field within which I situate my project.[5]

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[4] "The term is used here less in the sense it has in the idealist critique of pure reason than in the sense it has in the dialectical critique of political economy" (Horkheimer 206n14).

[5] Goldberg outlines such an affirmative concept of the post-humanities in "The Afterlife of the Humanities": "By post-humanities I mean then not the end of the humanities, their death or demise, and so their post-mortem. Rather, I intend by this the posing of alternative modalities for taking up, for doing, for engaging (and for an engaging) humanities. . . . I am urging that this conception of a post-humanities encourage and embrace a reformulating of public reason, of what it amounts to and how vigorously to promote it."

Let me further clarify this distinction with reference to two authors whose works have had a substantial influence upon my own. First, Luhmann's sociological systems theory is a monumental effort to reconstruct sociological theory in the general tradition of Weber and Parsons, and I largely understand both the unique contributions and the theoretical limits of my own project in relation to his work. In an intellectual progression running largely parallel to post-structuralist trends in contemporary critical theory, Luhmann abandons Parsons's adherence to action theory based on classical cybernetic systems theory, incorporating concepts of functional differentiation, self-reference and paradox, and eventually adopting the technical jargon of second-order cybernetics, to construct a grand theory of society based on communication as its primordial operation. Like the Frankfurt School, Luhmann also rejects the classical, Cartesian "transcendental concept of the subject" as a "dead end way of thinking" (*Social Systems* xli), "deconstructs the very distinction between Subject and Object" ("What is the Case?" 135) that grounded traditional theory and, like Horkheimer, refuses to "give up the search for describing the unity of society" (127), preserving society as his self-reflexive object by way of second-order observation.

However, despite its substantial and creative synthesis of a wide range of theoretical tools into a unified theoretical framework, I find that Habermas's critique offers a crucial distinction between the premises of Luhmann's project and those of critical theory: to the extent that "subject-centered reason is replaced by systems rationality," systems theory "replaces metaphysical background convictions with metabiological ones" ("Excursus on Luhmann" 385). In other words, systems theory replaces the ethical-political engagements emerging from concrete social groups with a unified, rationalized world of systems emerging out of a scientific-technical consensus. Though sociocybernetics does, in theory, provide the tools to effect social change—in Luhmann's words, it "could create a surplus of structural variations that

could induce the observed function systems to consider alternatives to their own modes of operation" ("What is the Case?" 136), and "offer novel possibilities for observation" (138)—and it incorporates literary techniques such as parody and irony into its dynamic theory-construction, in practice, its scientific rigor (and impenetrably abstract prose) actively discourages the development of sustained critical projects within its purview, leaving it to preside over an elaborate systematic description of society as it is observed by the conservative organs of scientific method. In contrast to critical theory's central concern with constructing new techniques of social emancipation, resistance against injustice and sustaining concrete forms of public reason within an increasingly complex modern society, Luhmann's "methodological antihumanism" (Habermas, "Excursus on Luhmann" 378) coldly maintains that society is nothing other than what is observed through sociology's neutral scientific apparatus: "Evolution is sufficient for survival" (Luhmann, qtd. in "Excursus on Luhmann" 377).

Second, I refer to Bogost's pioneering work of videogame criticism as a central point of departure throughout my project. I cite his work often not to challenge his claims so much as to signpost my own work, to note the various subtle but fundamental distinctions between my critical-theoretical position and his own mode of comparative criticism. Bogost's work has exerted a great deal of influence within software and game studies as well as the commercial videogame industry over the last decade. I will leave my concrete analysis of his work in relation to the specific topics of game-playing, intellectual property, and procedural literacy to the relevant moments in each chapter; for now, I will comment on his method of comparative criticism and his associated theory of unit operations.

The approach to criticism that Bogost develops in *Unit Operations* is "fundamentally a comparative one" (ix), and is derived from his academic training within the field of comparative literature. Citing the American Comparative

Literature Association's mission to study "the interactions between literature and other forms of human activity" (50), Bogost initially understands the role of criticism within his study of videogames as a primarily hermeneutical activity:

> Instead of focusing on how games work, I suggest that we turn to what games do—how they inform, change, or otherwise participate in human activity, to borrow the ACLA's words. Such a comparative videogame criticism would focus principally on the expressive capacity of games and, true to its grounding in the humanities, would seek to understand how videogames reveal what it means to be human. (53)

Considering my similar training in comparative literature, I also find value in such a comparative approach. However, I find that in Bogost's work, this critical activity of revealing "what it means to be human" is largely elided in favor of developing the technique of comparison itself as a "general practice of criticism" (15), with intrinsic value. Comparative criticism is construed by Bogost as an autonomous, generic procedure of comparative analysis that offers to "uncover the discrete meaning-making in texts of all kinds" (15), a "useful lever of explication" (54) with little regard for how any such activity relates to a humanist concern for reasonable conditions of life. In fact, the latent traces of humanism that marked Bogost's early work would later be extinguished entirely, by a defiant methodological antihumanism confirming his complete separation from humanistic concerns: "The philosophical subject must cease to be limited to humans and things that influence humans. Instead it must become *everything*, full stop" (*Alien Phenomenology* 10).

Accordingly, I understand Bogost's theory of unit operations as a proto-sociocybernetic concept, akin to Luhmann's systems theory.[6] Like the autopoietic systems of Luhmann's theory, Bogost's unit-operational systems construct

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[6] Note that Luhmann's concept of *system* does not match Bogost's own use of the same term. Although Bogost focuses on a distinction between "unit operations" as "characteristically succinct, discrete, referential, and dynamic" and "system operations" as "characteristically protracted, dependent, sequential, and static" (*Unit Operations* 4), Luhmann's concept of system in fact has much more in common with Bogost's concept of *unit* than *system*.

meaning from self-referential relations among parts: "The difference between systems of units and systems as such is that the former derive meaning from the interrelations of their components, whereas the latter regulate meaning for their constituents" (*Unit Operations* 4).[7] Starting from the premise that "any medium, . . . can be read as a configurative system" (ix) "may be observed in any artifact, or any portion of any artifact, rather arbitrarily" (14), providing the critic-observer with "a lever for understanding any form of human production as potentially procedural" (15). All forms of human expression are thus subsumed under the transcendental unit-operation concept: "stories are instances of unit-operational expression" (69); Cultural artifacts "implement their expression through unit operations" (73); Unit operations "function at a higher level than linguistic signs" (105); even the forms of culture and consciousness themselves are packaged into "cultural unit operations" (45) and "psychic unit operations" (150).

I therefore distinguish my approach in relation to Bogost's unit operational comparative criticism along similar lines as Luhmann's systems theory, on account of their mutual refusal of the (post)human condition. In comparison to Habermas's guiding image of Luhmann's social systems as "the flow of official documents among administrative authorities" (Habermas, "Excursus on Luhmann" 378), or the image of Turing's ideal life as "the discrete state machine, communicating by teleprinter alone" (Hodges, qtd. in Hayles, *How We Became Posthuman* xii), I take the guiding image for Bogost's unit operations ("not only applicable to software in general and videogames in particular, but also"—as an afterthought—"poetry, literature, cinema, and art" [ix]) to be a software engineer-cum-hacker, disassembling, reverse engineering, or

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[7] Compare to Luhmann's summary of autopoietic systems: "[E]verything which is used as a unit by the system is produced as a unit by the system itself. This applies to elements, processes, boundaries and other structures, and last but not least to the unity of the system itself" ("The Autopoiesis of Social Systems" 174).

just messing around with a console videogame system, such as the Atari 2600.[8] For this reason, my relation to Bogost's comparative videogame criticism has additional significance to my project, reminiscent of Marx's generative relation to Smith, Ricardo and Mill: it condenses into an abstract, coherent theoretical form several universal principles and assumptions of contemporary ludocapitalism that comprise the object of my critical (post)humanist response—not as a simple rejection of the theoretical foundation of the software and game studies fields, but as a dialectical elaboration of their fundamental principles, theoretical concepts and objects of engagement into the domain of ethical-political human activity central to critical theory.

Method

I break down the transitions characterizing contemporary technoculture into three analytical aspects: a management style, an economic paradigm, and a techno-linguistic infrastructure. The management style is *game design*, an indirect technique of behavioral control through the procedural regulation of a social group or activity. The economic paradigm is *ludocapitalism*—while related to such popular concepts as the New Economy (Kelly), friction-free capitalism (Gates), or post-industrial society (Bell), I wish to place particular emphasis on its contemporary affinities with digital games, virtual worlds and other ludic modes of contrived competition.[9] Finally, the techno-linguistic infrastructure is *software*, simultaneously comprised of an idealized sphere of perfectly-rational communication, and a material landscape of a complex,

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[8] See Montfort and Bogost's *Racing the Beam*, a fascinating interdisciplinary study of the Atari 2600 platform across a variety of technical, cultural and artistic registers, for this particular image.

[9] The term *ludocapitalism* was coined by Julian Dibbell, who speculates that "the economic system we inhabit must, . . . contrive new meanings for our daily grind" (298). I will discuss Dibbell's work at length in Chapter 4. Malaby has also developed this argument in relation to his concept of technoliberalism mentioned earlier.

continuously-evolving sociotechnical literacy of codes, standards, languages and protocols.

Each of these aspects has been championed as an inversion of the historically prior paradigm it purports to replace—game design inverts hierarchical management of work; the friction-free capitalism of extra-sovereign, multinational corporations inverts that of industrial capitalism tied to state power and fixed, localized flows of capital; and software development and the digital communication of protected, controlled ideas, brands and virtual goods inverts hardware manufacturing and the physical delivery of material goods. However, I characterize these transitions not in terms of pure negation or replacement, but rather through the Hegelian concept of *aufhebung* (sublation) or determinate negation: the prior elements are preserved and upheld in a synthesis that signifies more than merely the absence or opposite of the original elements. Sublation accounts for the novelty or newness of new media while preserving the history of the social forms they transcend. Beyond Hegel's historical term, this general notion of sublation can be found in Schumpeter's concept of "creative destruction" as well as McLuhan's pair of popular slogans, "the medium is the message" and "the content of a medium is another medium."[10] The old, historical paradigms of work, industrial capitalism, and hardware production are still essential components of the new forms of play, ludocapitalism, and software, all of which are only comprehensible in relation to their sublated elements. In this model, critical thought involves reaffirming the presence of the negated elements within the synthetic concept, so that its critique does not imply a conservative return to the original but a more nuanced consideration of alternative syntheses.

To take one example, the concept of work as productive, alienated industrial labor is often contrasted against the notion of a free-spirited, humanist culture of

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[10] See Grosswiler's "The Dialectical Methods of Marshall McLuhan, Marxism, and Critical Theory" for a survey of the implicit affinities between McLuhan's method and dialectical theory.

game-playing, an expression that originates with Fourier, and extends through Marcuse to contemporary theorists of digital-ludic utopia such as McGonigal and Castronova. Discourses of game-playing reinscribe alternative claims for rational and productive distributions of activity, such as education, practice or training for future vocation, under the guise of intrinsic motivation (fun, happiness and/or pleasure). Marcuse writes: "The transformation of labor into pleasure is the central idea in Fourier's giant socialist utopia" (207). The realization of such a harmonious ideal, however, is difficult to reconcile with necessity: "Jobs which Fourier describes as isolated and lacking attraction, such as staffing the watchtower or coach driving, 'will be assigned to a few individuals whose temperaments are appropriate to such tasks, which they will transform into games'" (Granter 37). As shown here, when the productive capacities of such so-called "games" become aligned with the objectives of pragmatic institutions (such as government administration, school systems, or business organizations), they may retain little in common with the liberating ideals of play that they depend on for their progressive legitimacy. Marcuse negates this negation of work transformed into play, commenting: "Work as free play cannot be subject to administration; only alienated labor can be organized and administered by rational routine" (208), a sentiment Marx also held: "Work cannot become a game, as Fourier would like it to be" (qtd. in Granter 66). We can then draw a distinction between (serious) games designed to direct the intrinsic motivation of games towards fixed objectives such as, and (free) play irreducible to rational social administration.

Further, it is not sufficient to examine each of these transitional aspects of ludocapitalism in isolation, but they must be understood in relation to one another in their contemporaneity. Each of these three aspects can also be said to follow what Edwards calls a *mutual orientation*:[11] each presupposes and takes for granted the

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[11] The term *mutual orientation* is adapted from Edwards's *The Closed World*, where he describes the mutual orientation between MIT's Whirlwind project and the Air Force around 1950: "The source of funding, the political climate, and their personal experiences oriented Forrester's [Whirlwind] group

natural reality of each other, to the point that cause and effect among them is difficult to determine in isolation. The aspects mutually *coevolve*, in the sense that Hayles describes the co-evolution of technical artifacts and humans,[12] or in the sense that Luhmann describes, following Parsons, as *interpenetration* of various functionally differentiated subsystems of society.[13]

Game design, as a paradigmatic management style, presupposes the deployment of complex software systems capable of processing the near-instantaneous circuits of individualized feedback necessary to produce valuable results. Software development, in turn, presupposes the New Economy ideology of a natural, global, frictionless "marketplace of ideas" to provide legitimacy for the expansive, global intellectual property protections that make the most profitable returns on large-scale software production possible. Ludocapitalism presupposes game design as a decentralized system of control that produces its own extra-sovereign legitimation, where multinational power can be safely deposited and invested beyond the political influence and boundaries of the nation-state.

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toward military applications, while the group's research eventually oriented the military toward new concepts of command and control" (82). He summarizes the concept as "each guiding the other's conception of research problems and potential solutions" (222).

[12] See Hayles's *My Mother Was a Computer*: "These two dynamics—the continuing development of intelligent machines and the shifting meanings of key terms—work together to create a complex field of interactions in which humans and intelligent machines mutually constitute each other. Neither kind of entity is static or fixed; both change through time, evolution, technology, and culture. In other words, to use an aphorism that cultural materialists have long realized as a truth of human culture: what we make and what (we think) we are coevolve" (216).

[13] See Luhmann's *Social Systems*: "We use the concept of 'interpenetration' to indicate a specific way systems with a system's environment contribute to system formation. . . . Interpenetration is not a general relation between system and environment but an intersystem relation between systems that are environments for each other" (213); "The concept of interpenetration does not indicate merely an intersection of elements, but a reciprocal contribution to the selective constitution of elements that leads to such an intersection" (215).

Finally, these mutually-oriented transitions converge in a pervasive culture of *computationalism*[14] as a twentieth-century form of rationalism and the autonomous embodiment of knowledge, against which I argue in support of open discourses that recognizably relate to public interests. The progression of this culture can be summarized by comparing the following quotes from two famous figures in computing history: the first is from Ada Lovelace, who collaborated with Charles Babbage in 1843 to publish a series of notes on the Analytical Engine: "The Analytical Engine has no pretensions whatever to *originate* any thing. It can do whatever we *know how to order it* to perform" (722).[15] The next is from John von Neumann, reportedly given at a 1948 talk in response to an audience member questioning the ability of a machine to think: "You insist that there is something a machine cannot do. If you will tell me precisely what it is that a machine cannot do, then I can always make a machine which will do just that!" (qtd. in Jaynes 7). Although both make a similar point about the theoretically unlimited performative abstraction of computing machines, the shift from Lovelace's negative qualification to von Neumann's positive hubris reflects a broad transition in the hegemonic ideology of computing machines that was applied to universal descriptions of reality in the twentieth century. While Lovelace emphasized the machine's practical inability to transcend its constrained,

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[14] David Golumbia's *The Cultural Logic of Computation* defines the term *computationalism* as "a commitment to the view that, a great deal, perhaps all, of human and social experience can be explained via computational processes" (8). I read this as an extension of Hayles's concept of the "Regime of Computation" (*My Mother Was a Computer* ch. 1), expressed from a more critical-leftist ideological perspective.

[15] In Turing's seminal article "Computing Machinery and Intelligence" that introduced the "imitation game" as an approximation to the question: "Can machines think?" (442), he popularized (and readily dismissed) Lovelace's comments as "Lady Lovelace's Objection" (450). In light of Turing's assumption that "[t]here is no theoretical difficulty in the idea of a computer with an unlimited store" (438), it is worth considering Lovelace's pragmatic sensibility immediately preceding her oft-quoted lines: "It is desirable to guard against the possibility of exaggerated ideas that might arise as to the powers of the Analytical Engine. In considering any new subject, there is frequently a tendency, first, to overrate what we find to be already interesting or remarkable; and, secondly, by a sort of natural reaction, to undervalue the true state of the case, when we do discover that our notions have surpassed those that were really tenable" (722).

order-following subservience, von Neumann emphasized the machine's theoretical superiority as always a mere matter of programming away from the execution of pure thought.

This rationalist position thrived in early 20th century positivism, surviving in some mainstream fields of the modern empirical social sciences, including cognitive science and behavioral psychology. Such disciplines attempt to equate human thought with scientific logic, presenting formalized, computational models of human behavior that can be implemented on computing machines. Any task a machine can't already perform is presented as a theoretical possibility, a "not yet"—a solution not yet described in a sufficiently formalized language; not yet executed on a computer with sufficient memory or processing resources, not yet presented with sufficient environmental inputs.

The primary problem with such arguments in favor of whether computers can "think" is not only that it elides the philosophical impossibility of perfectly articulating the entirety of conscious thought into formal procedure (one can never describe exactly what one is thinking), or that it ignores the material time and space costs of pragmatically executing any such procedure on a concrete machine (an algorithm might require a computer with as many bits of memory as there exist atoms in the universe running for a million trillion years to complete its computation), but that such theoretical zeal for artificial intelligence conceals the political stakes of control over the manufacture of such intelligence. If (or when) aspects of human thought are reproduced by a machine, control of the machine will amount to control over those aspects of humanity.

I frame my critique of the computationalist narrative that runs through this project as a twentieth-century refraction of the classical Marxist argument against the myopic deskilling of physical labor in service of monolithic technological progress, now taking the form of the deskilling of intellectual labor, or knowledge work.

Following critical theory and Marx's attitude toward praxis (succinctly stated in *Theses On Feuerbach*: "Philosophers have hitherto only *interpreted* the world in various ways; the point is to *change* it" [11][16]), the final methodological element of this project explicitly moves beyond descriptive systems analysis to modes of ethical and political action guided by the critical axes outlined above. I frame such action through a mix of locally-oriented languages of resistance, ambivalence and contingency, derived from, among others, Foucault's analysis of power relations through forms of resistance, Feenberg's Marxist-inspired concept of the ambivalence of technology, and Coombe's adoption within critical legal studies of a postmodern "ethics of contingency" respectively.[17]

As a meta-narrative of transition, ludocapitalism is reminiscent of earlier periodizations of capitalist development such as post-modern (Lyotard), late (Jameson), post-Fordist (Amin; Hall), and post-industrial (Bell), all of which have been productively applied to critical theories of digital media. However, I believe that the connotations of game-playing within this key term can promote a ludic turn in critical theory through a more direct dialog with the nascent field of digital game studies, which in turn can lead to better accounts of contemporary modes and struggles of cultural creation and social organization, both within software and game studies in particular and throughout digital media discourse in general. My dissertation will develop a range of such accounts within the conceptual framework of ludocapitalism I have set out above. Next, I will present a cross-section of categories under which I have organized this body of research, and through which I will relate these concrete studies back to my overall critical project.

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[16] Compare to Luhmann's emphatic comment on systems theory that "There is no Eleventh Thesis in Parsons!" ("What is the Case?" 129).

[17] On Foucault's analysis of power relations and forms of resistance, see ("The Subject and Power" 780). On Feenberg's concept of ambivalence, see "The Ambivalence of Technology." On Coombe's ethics of contingency, see (Coombe 297–9).

Project outline

The following four categories (game-playing, property, literacy, and money) present a vocabulary of critical terms and a geography of confrontations for the public significance of a range of ludocapitalist artifacts in contemporary media environments. Each of these key terms resonates with the liberal humanist subject of modernity, but is transformed through conditions of ludocapitalism into altogether different forms of technical and institutional struggle:

1. *Game-playing*: the gamification of business and culture threatens to reinscribe traditional hierarchies of power through the institutions regulating behavior through techniques of procedural persuasion, pitting a ludic Utopia of well-designed games against a resistant, radical free play escaping such game objects through aesthetic affirmations of an inexhaustible (post)human subject.

2. *Property*: the commodification of creativity confronts the radical openness of freely shared culture, and the privatization of knowledge impinges upon cultures of orality leading to the enclosure of social commons, reduced freedoms of public speech, and increasingly transactional social and political relations biased toward oligopolistic market structures.

3. *Literacy*: languages accessible and accountable to civil society confront proprietary and expert-oriented technical codes constraining everyday communication and public expression.

4. *Money*: decentralized computational networks indirectly governed through technological protocol confront regulated political spaces of collective self-governance.

   This cross-section of categories of the liberal humanist subject is undergoing social-historical transformations into the technoliberal posthuman subject of

contemporary technoculture, ushering in the game-like political-economic system I have characterized as ludocapitalism. Each category corresponds to a chapter in my dissertation, where I develop the abstract transitions outlined here in relation to concrete case studies of particular game/software projects and social movements within the contemporary technocultural landscape.

Chapter outlines

Chapter 1 develops a critical concept of game-playing, taking a critical perspective on modern applications of the "gameful" theories of game studies to such disparate fields as education, corporate training, advertising, politics, and other institutions of modern everyday life. I analyze the rhetoric of gamification and serious games, which range from viewing everyday social institutions from a ludic perspective to the total view of life itself as a game or a game-playing world as a form of Utopia, exemplified in the work of McGonigal and Suits. As such gameful theory commands increasing popular attention, it is also beginning to amass significant cultural capital within academic thought and fast-growing game design research centers fueled by game-industry collaborations, such as MIT's game lab collaboration with Singapore's media industry.

I place gameful theory in a historical context, comparing its Utopian ideals and universalization of the concept of game-playing to a strikingly similar rhetoric of play that motivated the German idealist Schiller's liberal aesthetic ideology. Schiller's philosophy is founded upon a concept of the "play-drive" [*spieltrieb*] that elevates play to the transcendental constitution of humanity. Following de Man and Warminski's critical commentary, I read Schiller's philosophy as a humanization of Kant's earlier concept of "freeplay" [*freies Spiel*], one that closes off the paradoxical unboundedness of the concept of play in favor of a particular aesthetic worldview

conceived as a totality. Reading Schiller's play-drive as a ludic model of classical liberal humanism with Kant's freeplay maintaining critical resistance to its totalization, and drawing parallels between Schiller's play-drive and McGonigal's gamefulness, we can begin to imagine a resistance to the aesthetic totalization of digital game-playing by distinguishing such a concept from the contemporary equivalent of Kant's freeplay.

I develop what such Kantian resistance looks like in contemporary game-playing discourse by identifying the dominant ideology underlying modern game studies, which I find in Malaby's concept of technoliberalism as faith in the free-market manipulation of technology such as software tool creation or digital game design to solve social problems. Through an account of the entrepreneurial virtual world of Second Life and the parallel organization of its Silicon Valley startup company Linden Lab, I analyze how the rhetoric of universal creative freedom in Second Life's digital frontier is in fact contrived through particular technological and social developments that mark the boundaries of play possible in a particular entrepreneurial model of the digital subject envisioned by the company. I contrast this entrepreneurial vision against the creative anarchy taking place around the Minecraft computer game and its proliferation of unofficial mods and add-ons. Minecraft has its own limitations and unanswered questions regarding the uncertainty of its future leadership and its contrived freeplay; however, it demonstrates an alternate and unprecedented vision of a creative subject produced by digital game. The question of digital freeplay, as the creative human potential that resists being captured in our concept of well-designed digital games, is not one that submits to a definitive answer, but such questioning is produced through comparative studies of communities of open-ended creative play.

Chapter 2 traces the ironic, spectral history of the iconic game brand Tetris. Through this history, I explore how creative play under capitalism became commodified as objects of intellectual property, and how game design developed

from a communal activity of social becoming to an authored process, a singular manifestation of universally protected ideas of individual genius.

The puzzle videogame Tetris, from its origins in cold war USSR where private intellectual property rights were virtually nonexistent and where circulation was as vital to cultural value as conception, to its global status as one of the most celebrated and litigated video game properties of all time. In the game's simple concept of falling tetromino-shaped blocks collecting in a rectangular glass, the protected design selectively abstracted to absurdity is separated from its material history of creation and distribution, leaving behind a silenced cultural history of file-sharing and platform adaptations, design and technical variations, and communities of passionate players whose creative efforts are unceremoniously absorbed into the singular corporate mass of protected intellectual property.

A close reading of the arguments presented in a recent copyright and trade dress infringement case won by The Tetris Company against a small iPhone game startup reveal the fundamental ambiguities and contradictions in the history of modern intellectual property law that has served to commodify a concept of singular, creative genius at the expense of the cultural and social environment that participates in the production of such creativity. Adopting a discourse of critical legal studies advocating shifts in the interpretation of intellectual property laws in favor of a more balanced consideration of the various social and cultural factors at work in creative expression, I argue that works of mourning that preserve the ephemeral memories of the silenced specters haunting intellectual property's objects can contribute to a discussion of how best to preserve and promote the cultural commons increasingly enclosed by the corporate commodification of creativity in a digitally designed world.

Chapter 3 examines the expansion of computational infrastructure from its military-industrial origins to its present-day democratic tool of open exchange. In particular, I interrogate the issue of "procedural literacy" as a form of new media

pedagogy, and the politics of expertise that guides control of the communication infrastructures comprising digital civil society, as a topic of increasingly public policy and debate. In my analysis, I focus on the relations between the discourse of digital languages and code literacy, the increasing oligarchical enclosure and ownership of the technical infrastructure of mass communications media by information technology corporations, and the administration and self-conception of the liberal public sphere in civil society.

The theoretical work in this chapter attempts to distinguish valid calls for new mechanisms of participation in a reconstituted and revitalized public sphere from more restricted calls for technical mastery in service of controlling technocratic interests. I argue that a critical concept of literacy can be distinguished from a more vocational notion of mastery through the emancipatory political potential found in the liberal concept of the public sphere, which in order to be legitimate should be held accountable to an open, inclusive, democratic discursive process that validates the knowledge and experience of its various communities. In terms of procedural literacy, I argue that this process requires an appreciation of several points commonly ignored in rhetorics of mastery: an ethics of complexity in relation to a code's subjects, a morality of code that recognizes accounts of injustice and inequality, and a critique of operational efficiency that considers additional values such as readability and flexibility in addition or in place of technical execution.

Taking these points into account in relation to the code literacy of today, I argue that a critical code literacy should not be presented as a set of training techniques to deliver mastery of today's technical languages and vocabularies to an educational mass-market, but must be conceived as an ongoing project of self-fashioning digital environments that can accommodate the varied discourses of creative subjects, through structures of inclusive, collaborative design more democratic than the autocratic or oligarchic control underlying most open-source software

projects or programming language specifications. Such a literacy project favors the creation of new technical vocabularies and formations of new structures of knowledge before and above the education of digital neophytes in the use of existing professional technical tools.

Taking the JavaScript programming language as an object of critique, I explore the institutional interests underlying its design evolution, and use a model of design viscosity to examine the barriers in place inhibiting local community adaptations that favor a univocal representation of procedural knowledge. I present two programming language projects, DrScheme and Processing, as exhibiting alternative structures of procedural literacy. Through a comparative analysis and appreciation of the contributions these language designs offer, I conclude this chapter by offering the practice of end-user programming language design itself as a form of critical code literacy that demands greater attention by those calling for a more inclusive and democratic digital public sphere.

Chapter 4 studies the decentralized virtual currency project, Bitcoin, as an archetypal, ideal type of money in ludocapitalist economy. Following a comparative analysis of metallism and cartalism in classical modern theories of money, I proceed to read Bitcoin as a form of "play money," placing it in the context of game currencies within virtual world economies first studied by Castronova and expanded by Dibbell into a general theory of ludocapitalism. Despite the similarities to game economies, however, the differences between traditional game-economy designs and Bitcoin makes for a very different type of money-play incomprehensible as game-playing according to either economic rational-actor game theory or theories of virtual world game design, and it is precisely its incomprehensibility that makes it a generative object of study from a more open-ended ludic perspective.

Next, I consider the multivalent identity of Bitcoin along various hermeneutic perspectives: as a technical software project, as a political ideological statement, as a

speculative fiction, as authored text, as performance, as money, and as a financial asset or investment vehicle. The discourse of Bitcoin cuts across all of these disciplinary boundaries while questioning and transforming classical understandings of each, leading me to consider it in terms of a Foucauldian initiation of discursive practice.

Rather than enthusiastically accept or emphatically reject Bitcoin's premises and promises of the future of money, I take a balanced appreciation of its role as a sustained experimental intervention in economic discourse, albeit one that harbors a strong techno-libertarian ideology embedded in the project's software-centric social organization. Amid the varied interpretations of Bitcoin and speculations about its future, I consider how to sustain critical discourse through such a ludicrous technological project by tracking how communities are thinking through Bitcoin's popularity to generate alternative forks, adaptations, and clones of the distributed currency system as an emerging mode of technological commentary and discursive struggle over future meanings of money. Beyond Bitcoin itself, I read the broader field of crypto-currencies both competing against and derived from Bitcoin as a diaspora of competing protocological language-games, each enacted through the self-governing consensus of the machinic voices of its committed participants. Guided by this analysis, I offer an interpretation of protocol as play that challenges Galloway's reduction of protocol to a "physical logic" without alternative that can only be countered through hypertrophy-inducing exploits within the protocol itself. Rather, the field of play money as produced by the Bitcoin diaspora encourages us to read political and social implications within protocol design itself, recognizing such debates as an emerging, experimental form of public policy operating in an extra-governmental realm of networked imaginary.

Summary

This study contributes to the fields of software and game studies a critique of the forms of cultural hegemony the conditions of ludocapitalism impose on software and game production, and that is reinscribed within politically-neutral social-scientific and systems-theoretic studies. Rejecting the unified rationality of game rules, intellectual property, technical expertise and fungible money pointing to computation as the ground of being and circumscribing the modern subject of contemporary ludocapitalism, this study offers alternative dialectical categories of game-playing, ownership, literacy, and wealth that are instead produced through social and historical tensions and struggle, tethered neither to a fixed human essence nor to a naturalized technological inheritance. What is at stake in such a reconstructed (post)human subject is the crucial link from software and game criticism to political and ethical deliberations on the impact of the conditions of ludocapitalism on our collective forms of life, and the ability of such a renewed public reason to influence the basic terms and tenets of our technological future through effective ongoing public policy.

Chapter 1

Play and Freedom

Introduction

In this chapter I develop the concept of game-playing as central to the formation of a ludocapitalist subject, a concept that has gained renewed relevance through the rise of digital play forms. From the start of the Cold War to the present, game-playing has developed into a mediating concept between the human subject and the computing imaginary in contemporary technoculture. For post-industrial knowledge workers, play can no longer be conceived as the humanist negation of the relationship between wage-labor and capital characteristic of industrial capitalism, as rhetorics of play are increasingly invoked from within hybrid processes of creative production. As an academic field of game studies has rapidly emerged in the twentieth century as the ideological and pedagogical counterpart to the digital game industry, game-playing has become visibly incorporated into capitalism as a broadly progressive movement, including organizational strategies for flexible and decentered management and new media forms of interactive mass entertainment and pedagogy.

Although the specific forms and techniques of contemporary digital play are undoubtedly novel, I recognize the tension between traditional work practices

and liberatory forms of play as a recurring theme with a long history in Western thought. With the concept of the *ludocapitalist* subject, I mean to emphasize the under-theorized link between an idealized concept of play and the free, autonomous human subject at the center of Enlightenment discourse—a discourse that, inverted through the Marxist tradition into an ideological instantiation of the historically-specific capitalist mode of production, also dialectically constitutes the horizon of critical thought and action. By theorizing the historical constitution of play idealism within Enlightenment thought, I form a critique of game-based metaphors that aim to structure institutional experience around the idealization of specific developmental or aesthetic qualities deemed essential to the human subject. Today, similar rhetoric surrounding digital play forms what I understand as the *posthuman* ludocapitalist subject, which reinscribes elements of classical and Romantic idealizations of play within post-industrial forms of instrumental reason, producing an idealized intersection of universal human agency with the sociotechnical milieu of the computer.

Based on a critique of the ludocapitalist subject implicitly invoked by game studies, I offer a *critical ludology* as an alternative disciplinary orientation for the field. My argument is structured around three interrelated claims. First, implicit in the term *ludocapitalism* is my claim that the concept of game-playing is not antagonistic or external to the contemporary logic of digital capital, but that it constitutes its essential characteristic and primary productive force. The transformation of work into play no longer holds the radical humanist promise of freedom from capitalist exploitation that it once did for Utopian socialists such as Fourier; rather, play has become generalized within capitalism itself as a discursive strategy for the indirect exercise of power through therapeutic, pedagogical and other institutional forms.[1] In contemporary technoculture, the "gamification" of bureaucracy has developed a fully-rationalized

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[1] See Andersen, *Power at Play*.

model of game design into a full-fledged science of management and behavioral psychology, tasked with isolating elements of intrinsic motivation that optimize the performance and productivity of a flexible workforce according to the direct needs of post-industrial organization.

I further claim that the specific contemporary form of this fusion of play and capital runs largely parallel to the fusion of *software* and capital in the computerization of society from the Cold War era to the present. Contemporary metaphors of game-playing and software were both substantially influenced by the RAND Corporation's operations research through the 1950s and 1960s, when the modern science of instrumental rationalization known as game theory developed a mutual orientation with the combinatorial power of computing machines to produce models and simulations of social behavior. In this now-paradigmatic formation, the notions of *game* (idealized as an infallible poker player maximizing his outcome within a formal rule-based system) and *software* (a metaphor originally extending the instrumental logic of computing hardware into the "soft" domain of human factors) became two sides of the same research program to model and organize human behavior according to a model of rationality constructed in the image of electronic computing machines.

My third claim is that play is idealized as a symbol of humanity through discourses that link play to such autonomous, value-laden concepts as learning, empowerment, socialization, creativity and beauty. Although play contains paradoxical elements in its serious negation of seriousness, I argue that the dialectic of play has historically implied a much loftier concept of humanity than the abstract form of meta-communication that Bateson observed in animals play-fighting. Recognition of objects or activities as games or play often imply humanistic ideologies of progress, development and freedom. Such ideologies are complicit in the production of a transcendental human player-subject, a figure that, for the German

idealist Schiller, "carries out the will of all through the nature of the individual" (138). This is where the critique of play gains its political-ethical significance. While Schillerian idealization of play produces an aesthetic ideology capable of mediating between the work of art and the state apparatus, similar idealizations of digital play today mediate between game design and the production of technological infrastructure resulting from the institutional implementation of such "serious games."

My discussion within this chapter proceeds as follows:

First, I establish an intersection between a progressive game-playing idealism and a pervasive computational imaginary that has structured the quickly-expanding field of digital game studies. This paradigm, which Sicart identifies as "proceduralism" and associates with Bogost's theories of procedurality, is an idealistic conflation of both game and computer as orthogonal systems of rule-based rationality. Drawing upon Galloway's recent critique of Object-Oriented Ontology, I argue that this proceduralist position lacks a productive concept of political agency and, under the guise of neutrality, legitimates and reinscribes existing technocratic power formations. In response, I call for a critical ludology that contextualizes this fusion of game-playing and software as the dominant liberal-humanist rationality of our era.

Next, I argue that this pervasive position within contemporary digital game studies is founded on an idealism that runs parallel to the classical enlightenment position within German philosophy. I relate the present state of digital play rhetoric to Schiller's idealization of play as an authentic expression of the aesthetic perfection of humanity, drawing parallels between his vision of the aesthetic state as a concrete realization of play as beauty and contemporary idealistic exaltations of gamification and gameful design.

Third, I establish the contours of an approach to digital game-playing forming the basis of a critical theory of the ludocapitalist subject. Here, I integrate three related

fields of analysis: social theories of game-playing ontology, critical theories of the posthuman subject, and material histories of digital game production.

Finally, I apply this integrated approach toward a comparative analysis of two quasi-game software projects, Second Life and Minecraft, both of which are inadequately understood from a formalist or proceduralist approach.

Through this analysis, I offer two theses derived from the critical ludology developed in this chapter: first, the material history of each game's production relates to the ideal player-subject cultivated by the game environment, with significant parallels between the idealized agency of developers and players; second, that each game's form of idealized free play, as an interventional deviation from mundane labor, constitutes its ideological function. My comparison of Second Life's techno-liberal model of digital entrepreneurship against Minecraft's alternative neo-Renaissance model of digital craftsmanship reveals a contradictory, contested, and ever-changing concept of game-playing as integral to contemporary ludocapitalism, where the ludic quality of software refers to an ongoing ideological discourse about the ideal (post)human values our digital media should value, encourage and produce within its player-subjects.

1.1   Play and Procedurality

As the communications comprising our everyday lives increasingly transpire within the complex domain of personal networked computing devices, the industrial culture of commercial computer games increasingly impinges upon the everyday social realities of a growing public. According to a growing number of experts in professional game design and development, the compelling power of digital games to not only entertain but also to engage, motivate, and persuade is the key to a

computer-powered reformulation of our core social institutions, from schooling to corporate training, health care, advertising and political campaigning.

The bureaucratic concept of "effective procedure," epitomized since Turing by the abstract, universal logic of the digital computing machine, has become the fundamental substrate of our present age. In his exposition of "procedural rhetoric" in *Persuasive Games*, game designer and media theorist Ian Bogost has stated the injunction that "we must recognize the persuasive and expressive power of procedurality" (340), particularly as expressed by the medium of the videogame, as he cites the rise of persuasive videogames being successfully deployed across a variety of social institutions extending far beyond the entertainment industry to which it had once been restricted.

In the field of digital game studies, this "power of procedurality" that Bogost emphasizes is now often accepted as the structuring force establishing the contemporary social field, a power often construed as particularly appropriate, even exceptional, to the nascent videogame medium. In this computational-procedural worldview, social action is conceived as designing a set of rules to produce a desired outcome from an audience of game-players, whether the goal is to persuade, train, or entertain. The human agent at the center of this new social reconfiguration, the game designer, is the new professional class capable of playing with this power.

This worldview has not only been remarkably influential across both academic digital game studies and the videogame industry but, as Sicart notes in "Against Procedurality," it has also "helped deepen the understanding of some important notions on the ontology of games." Seen as a "continuation of the formalist work laid out by the original 'ludologists'" such as Juul and Frasca who helped establish the boundaries of the contemporary field of game studies, procedurality expands the ontology of such earlier formalist approaches from a narrow, ahistorical focus on explicit game rules to incorporate entire systems of social meaning into its ontological

horizon, while preserving the exceptionalist argument for the power of videogames that initially justified it as a unique and privileged domain of study.[2]

However, Sicart also notes the limitations of understanding games as procedural systems that act upon a circumscribed field of meaning: by deriving the entirety of a game's meaning and significance from its rule-based essence, such a perspective risks stripping all transformative agency from the player-subject. When playing a well-designed game produced by an expert within a fixed medium to be consumed by an undifferentiated audience, the player's task is reduced to merely "actively complete the meaning suggested and guided by the rules." The result of the proceduralist perspective, then, is to validate and reinforce a modern practice of game design as the art of managing a docile, receptive, largely powerless mass audience, whose "play" is circumscribed as raw material for the game designer to manipulate through the artful application of effective procedural rhetoric.

Through his critique, Sicart challenges the field of game studies to supplement the productive contributions of proceduralist orientation to games with a critical perspective that favors attention to the ethical and political possibilities rooted in forms of free play specifically opposed to the instrumental rationality of industrial game production. My reason for focusing on this meta-discourse on games taking place in the field of digital game studies is to critique the naturalization of an ontological discourse that risks covertly reinscribing the existing hierarchies of ludocapitalist power. The intent of such a meta-analysis is to challenge the complicity of academic digital game scholarship with systems of cultural hegemony within which it finds itself playing an increasingly active and pivotal role. McAllister places such scholarship alongside production agrees that such a disciplinary self-awareness is necessary: "analyses of the computer game complex should not only influence

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² I examine this early academic literature of formalist studies of videogames in depth in relation to the Tetris videogame in Chapter 2.

other critics and scholars but should also be used by them to take an active role in influencing the computer game complex itself" (49).

In order for my analysis to take an ethical and political position capable of distinguishing itself from a dominant, free-market rationality, I situate the concept of game-playing not just in relation to a game's isolated rhetorical content transmitted from designer to player, but also in relation to the human qualities of the player-subject that particular games preserve or produce through the overall material and social conditions of their production. I call this method of analysis "critical ludology," denoting an intersection of critical theory (specifically, a tradition of sociocultural critique roughly extending through Kant, Marx, the Frankfurt school and its successors within poststructuralism and cultural studies) with ludology (conceived both broadly as the study of game-playing and more narrowly as the academic/ideological wing of the contemporary computer game complex).

Critical Ludology

I position critical ludology metaphorically somewhere between *defragging* and *deconstruction*. The computer filesystem metaphor of defragging, referring to the algorithmic analysis and reorganization of a system's diffuse, constitutive fragments, seems an appropriate metaphor for the systematic manipulation of complex unit operations of social-technical meaning articulated by the proceduralist perspective.[3] Deconstruction, a term coined by Derrida in the late 1960s that self-consciously marks a philosophical event related to the undoing, decomposing, and desedimenting of structures, is also based on a technical methodological metaphor, albeit orthogonal to

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[3] The Digital Game Research Association organized its 2013 conference under the theme "Defragging Game Studies," reflecting a certain degree of popularity and resonance of this metaphor within the field.

defragmentation as it gestures in the opposite direction: away from unified structure and ontology, rather than towards it.

Critical ludology is an approach that refuses to consider a game as a ready-made object or system of technocultural meaning, but instead begins and ends with consideration of game-playing as an organizing mode of humanistic inquiry that extends beyond cultural products to be equally implicated in industrial and academic actors. Rather than subordinating game studies to established social-scientific methodologies, a study of games could self-referentially look to its own rich, ambiguous, historically-grounded discourse of game-playing to construct and delineate its own analytical orientation, one not merely reducible to a technical procedure of behavioral engineering. Game-playing can be researched and practiced as a distinct discursive form of its own, articulating a dialectic of human experience otherwise lost within instrumental approaches. In this way, any exceptionalism unifying the game studies field would be based not on binding game-playing to the repressive ideology of a computational-procedural worldview, but on a discursive form that represents a human-oriented play of the world, sensitive to a more politically-aligned social history.

The Game-Playing Object

Contemporary interpretations of game-playing, both regarding what an instance of game-playing *is* in our ontologies and definitions, and also regarding how instances of game-playing *ought to be* realized through our politics and ethics, often passively reiterate common ideological refrains of our dominant capitalist mode of production. For an example, let us recall Juul's remarks from 2003 on the "Heart of Gameness":

> Why is there an affinity between computers and games? First of all, because games are a transmedial phenomenon. . . . [G]ames are not tied to a specific set of material devices, but to the computational processing of data. Secondly, because the well-defined character of game rules means that computers can process them.

It is then one of the stranger ironies of human history, that the games played and developed over thousands of years have turned out to fit the modern digital computer so well. ("The Game, the Player, the World")

The "irony" Juul observes here is rather a tautological consequence of the post-Fordist lens implicitly used to frame his object: games, defined as procedural systems ontologically tied to the "computational processing of data," will certainly "fit the modern digital computer so well."

This situation makes a materialist, historical contextualization of those concepts that structure our game-playing objects an important counterbalancing critique of their supposedly neutral deployment. Revisiting the historical development of concepts of game-playing is therefore a key step in aligning a critical ludology with a materialism that resists the imposition of ahistorical structural metaphors, and that allows us to self-consciously examine its normative relation to cultural hegemony.

Here, I find the critique of play that Derrida set forth in his famous response to the structuralist anthropology of Levi-Strauss in "Structure, Sign and Play" to be worth a closer look. Derrida described Levi-Strauss's references to the concept of game-playing throughout his work as "always caught up in a tension. . . . Tension with history, first of all" (367). Levi-Strauss's "structuralist" moment, Derrida argues, risks "falling back into an ahistoricism of a classical type" which "compels a neutralization of time and history":

The appearance of a new structure, of an original system, always comes about, . . . by a rupture with its past, its origin, and its cause. Therefore one can describe what is peculiar to the structural organization only by not taking into account, in the very moment of this description, its past conditions: by omitting to posit the problem of the transition from one structure to another, by putting history between brackets. (368)

Theories that posit a single, ahistorical structure to their object of study are unable to account for the historical and ideological limitations of their mode of analysis. This leads to the inevitable conceit that such structure, as Derrida quotes Levi-Strauss on language, "could only have been born in one fell swoop" at the dawn of humanity.

While this first component of Derrida's argument speaks directly to the ahistoricity of ludology's early formalisms (I would also include some of the field's precursors such as philosopher of sport Bernard Suits's game-playing ontologies in this group), the next point is more subtle. Noting the "tension between play and presence" in structuralism, Derrida contrasts the structuralist "ethic of nostalgia for origins" with a "Nietzschean affirmation, . . . of the play of the world and of the innocence of becoming, the affirmation of a world of signs without fault, without truth, and without origin" (369). He observes that these "two interpretations of interpretation, of structure, of sign, of play" are irreducible to each other: there is not "any question of *choosing*," but we should rather "try to conceive of the common ground" (369–70). This dialectical understanding of play thus carves out an ethical position: If the former interpretation risks the mythical imposition of dogmatic structure without recourse to social history, the latter risks foreclosing the possibility of ethical-political action by reducing the play of the world to the will to power.

It is in light of this second interpretation that I read Galloway's trenchant critiques of the broader ontological project of Object-Oriented Ontology, the philosophical position underlying Bogost's proceduralist mode of videogame criticism. In an essay, "Realism and Post-Fordism," Galloway focuses on the recent resurgence of realism within continental philosophy in figures such as Latour and De Landa and extending to the speculative realism of Meillasoux and Harman and the object-oriented ontology of Bryant and Bogost, asking: "Why, within the current renaissance of research in continental philosophy, is there a coincidence between the structure of ontological systems and the structure of the most highly evolved

technologies of post-Fordist capitalism?" (347). His analysis draws a distinction between the claims of the new philosophical realism and the tradition of materialist critical theory since Kant and Marx. With respect to this distinction along the "task of the political," Galloway argues that "Realism is an unaligned politics. . . . By contrast, materialism is an aligned politics" (365–6). Unaligned political projects such as realism, he argues, are "unencumbered by the moral law" and "exist as mercenaries, often jumping the gap between friend and enemy" (365). In contrast, materialist projects, "aligned" with "something like an absolute moral sphere (history, the social totality)," are "tethered to a moral yardstick and equipped with an ethical mechanic able to pursue it" (365-6).

The unaligned politics of object-oriented ontology belies its implicit correlation with post-Fordist capitalism, which inevitably emerges through a pragmatist adoption of concepts oriented to the dominant mode of production. Such a correlation is present in the very etymological history of "Object-Oriented Ontology," as Latour recounted in 2005: "A few years ago, computer scientists invented the marvelous expression of 'object-oriented' software to describe a new way to program their computers. We wish to use this metaphor to ask the question: 'What would an object-oriented democracy look like?'" (Latour, "From Realpolitik to Dingpolitik" 14–5). Galloway responds in his essay: "But these democracies already exist. . . . Their democracy has little relation to the rule of the people, only the rule of the market" (363).[4] This political neutralization thus inherent in OOO would be merely an irrelevant (but harmless) theoretical exercise, if it were possible for such a "pure ontology" to exist in isolation from the *ought* of embedded ethical practice. However, such a categorical is/ought distinction is as suspect as the human/nonhuman

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[4] Galloway further remarks upon Latour and Harman's disingenuous notion of an anti-humanist "democracy of objects" in a blog post: "It is actually an anti-democratization, in two ways. First, because it removes the point of decision from people (the demos) to the object world at large. . . . And second because it allows certain objects to have more natural 'gravity' than others, thus in essence letting their 'votes' count double or triple" ("A Response").

distinction the anti-correlationist agenda hopes to break down, and Galloway situates this point of contention along realist/materialist lines: in contrast to the realist belief that ontology could and should not be politically aligned, materialists believe in a necessary unity of theory and practice, that ontology is inseparable from its material sociopolitical existence.[5] Galloway sides with the materialist position, that "the uncoupling of the ontological realm from the political realm is not entirely neutral," but is rather "an ideological strategy bent unwittingly or not on the elimination of competing discourses" (357).

Indeed, it is within the application of such object-oriented philosophies within the game industry, and by extension to the growing industry-aligned "gamification" of other social institutions, that the application of object-oriented engineering should be taken to task on account of its unaligned politics. In particular, I view Bogost's proceduralism in terms of his own recent reflections on his philosophical position, as an "extension beyond first principles, into the practice of metaphysics itself" of object-oriented ontology, as a "pragmatic" or "applied speculative realism, an object-oriented engineering" (*Alien Phenomenology* 674–7).

In order to move beyond such ethical or ontological impasses in the "object" of game-playing, I wish to frame game-playing not as a structurally-determined, ahistorical concept that ventriloquizes information capitalism but rather as the nexus of a discursive struggle rife with social tension, ambiguity, and an open-ended yet historically-bounded meaning. In the next section, I paint a broader picture of game-playing by recovering a key moment in the concept's modern history, where the humanist intersection of aesthetics and politics is played out in a discourse whose traces are still at work in our present-day game-playing concept. This moment is

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[5] This unity is often expressed through chiasmus, e.g., by Kant: "Thoughts without content are empty; intuitions without concepts are blind" (*Critique of Pure Reason* 86). Marx often employs formal antimetabole: "It is not enough for thought to strive for realization, reality must itself strive towards thought" (*Critique of Hegel's Philosophy of Right* Introduction).

found in the Enlightenment concept of *spiel* [game/play] which occupies a crucial but oft-overlooked place in Kant's aesthetic philosophy, and is subsequently elevated to a secular symbol of humanity in Schiller's own aesthetic writings.

1.2 Aesthetics of game-playing

A history of the game-playing concept, "if written, would prove to be virtually coextensive with Western thought" (Wilson 8). Game-playing is said to have existed since antiquity, with scholars observing elements of game-playing in ancient civilizations, animals, insects, and even the universe itself, where play "could be seen as one of many forms of evolving, emerging, self-organizing, complex dynamic systems" (Brown 251). The association of play with some of the core institutions of Western society is easily recognized in the Greek etymology of the associated words *paideia* (education/culture), *paidia* (play/game/pastime/sport), and *pais* (child). Accordingly, play functions as a pivotal concept in Plato's Republic. As Spariosu reads in his study of Hellenic thought, Plato's concept of play is both agonistic and educational, linked to both the mimetic function of art and the dialectic of logo-rational argument, and always precariously shifting between the serious and not-serious: "Plato is no doubt a serious man, but he needs play in order to remain serious. Through play he can have his cake and eat it too, for the dialogic form allows him to say what he cannot say" (192).

Play and Idealism

Within Kant's critical system, the concept of *spiel* plays a key role in his *Critique of Judgment* concerning aesthetic judgments of taste. For Kant, "pure" judgments of taste by which we declare something to be beautiful must be disinterested, so that the feeling of pleasure produced by the cognition of an object corresponds not to the

particular circumstances or an individual's personal interest but to the possibility of its universal communicability.[6] *Spiel* is the term that represents a spontaneous, harmonious relation of the imagination to the understanding in pure judgments of taste, which, being analogous to or symbolic of our moral law, forms the crucial link between the domains of pure and practical reason that comprised the first two Critiques: "The spontaneity in the play [*Spiele*] of the cognitive powers, whose harmony with each other contains the basis of this pleasure, makes that concept of purposiveness suitable for mediating the connection of the domain of the concept of nature with that of the concept of freedom, as regards freedom's consequences, inasmuch as this harmony also promotes the mind's receptivity to moral feeling" (37-8). Kant further qualifies this relation as one of "free play" [*freien Spiele*], because it is only when the play of the imagination is freed from any particular rule of cognition that such play is universally communicable to cognition in general:

> If a presentation by which an object is given is, in general, to become cognition, we need imagination to combine the manifold of intuition, and understanding to provide the unity of the concept uniting the [component] presentations. This state of free play of the cognitive powers, accompanying a presentation by which an object is given, must be universally communicable; for cognition, the determination of the object with which given presentations are to harmonize (in any subject whatever) is the only way of presenting that holds for everyone. (62)

Schiller raised Kant's conception of free play to an aesthetic ideal of humanity's enlightenment in his adaptation of Kant's aesthetics in Letters upon the Aesthetic Education of Man. For Schiller, a renowned poet and playwright himself, play was much grander than a mere educational technique to be carefully controlled and attributed primarily to children, as it was predominantly identified in the Greek

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[6] This Kantian idea of a necessary universal communicability of human reason survives in modern critical philosophy through e.g., Habermas's universal pragmatics, where intersubjective consensus-formation depends on counterfactual presuppositions as a necessary pre-linguistic condition for the possibility of communicative understanding and action.

tradition. Rather, play became for him the founding principle through which the idea of humanity, and its corresponding "aesthetic state" of political organization, is made possible. This marks a significant transformation both from the Greek concept of play and Kant's own abstraction and, as de Man comments in "Kant and Schiller," it is all but impossible to deny or escape the resulting influence of Schiller's paradigmatic aesthetic ideology on our modern, liberal institutions of knowledge: "Whatever writing we do, whatever way we have of talking about art, whatever way we have of teaching, whatever justification we give ourselves for teaching, whatever the standards are and the values by means of which we teach, they are more than ever and profoundly Schillerian" (142).

According an interpretive tradition initiated by de Man and extended by Warminski, Schiller offered a mis-reading of Kant predicated upon a psychological humanization of Kant's transcendental critiques, allowing Schiller to make a much more ambitious, universal statement of play as a symbol of humanity and model for political action than Kant's work ever suggested. Schiller's play concept is advanced through a symptomatic misappropriation of Kant's aesthetic of the sublime—one that "can be taken as the idealist operation," according to Warminski, of "setting up a sublime problematic and 'solving' it by recourse to the beautiful" (970). Schiller posits a binary distinction between two opposing drives/instincts [*trieb*]—sensual [*stofftrieb*] and formal [*formtrieb*]—as a sublime problematic, one that can only be reconciled as the result of an impossibly infinite operation. These two drives circumscribe the totality of human existence: "it is these two impulses that exhaust the conception of humanity" (67). The problematic of the concept of humanity so defined, then, is the seemingly impossible reconciliation of two opposed instincts within a single, unified, mediating concept: "This reciprocal relation of both impulses is, admittedly, a problem of the reason, which Man will be able to solve fully only in the perfection of his being. It is in the truest sense of the term the idea

of his humanity, and consequently something infinite to which he can approximate ever nearer in the course of time, without ever reaching it" (73). The solution to this problem is the play-drive [*spieltrieb*], which is this "reciprocal relation."

As Warminski observes, this "problem of the reason" to which Schiller offers the solution of the play-drive is precisely the task of the mathematical sublime presented by Kant—the faculty of reason's attempt to comprehend the absolutely large in its totality in a single intuition, a task resulting in aesthetic judgment only through its tragic failure. However, a "sleight-of-hand" (966) occurs in Schiller's version—the fulfillment of the problematic of the sublime is transformed into an object of beauty, one easily associated with wordly objects, figures, and common-sense concepts, and solved by recourse to play. Although Kant's concept of play was central in aesthetic judgments of taste in objects of beauty, it had no place in Kant's concept of the sublime, for which "it seems to be seriousness, rather than play, in the imagination's activity" (*Critique of Judgment* 98). Warminski notes that Schiller's linking play to the sublime rather than the beautiful is no mere mistake, since the entire aesthetic ideology hinges upon a sleight-of-hand enabling a solution amounting to the ideal of humanity directly reducible to practical knowledge and moral action, forming the basis of his aesthetic education of man.

Schiller's key concept of the play-drive, and its precarious relation to that of the human and its empirical nature, becomes the conduit through which the concept of humanity is able to reach the transcendental status it achieves in its ideal perfection. Schiller claims that humanity is able to attain such an ideal perfection only when it becomes most playful: "For, to declare it once and for all, Man plays only when he is in the full sense of the word a man, *and he is only wholly Man when he is playing*" (80). Beyond serving as a model of humanity, play can thus be viewed as a symbol for the system of total social organization upon which Schiller's aesthetic state is founded.

Schiller's rhetoric of play is powerful and emancipatory, and has had an enduring affinity with subsequent developments in critical theory, particularly in the "aesthetic dimension" of Marcuse's left-radicalism that fueled the French New Left in the 1960s. In *Eros and Civilization*, Marcuse's reading of Kant's aesthetic theory closely followed Schiller's interpretation, finding that "the aesthetic reconciliation implies strengthening sensuousness as against the tyranny of reason and, ultimately, even calls for the liberation of sensuousness from the repressive domination of reason" (179). The freedom Schiller finds in the play-instinct is translated by Marcuse into the liberation of the repressive order found in the de-sublimation of reason and the transformation of labor into play.

Digital Gamefulness

Today, many play-infused social movements gaining currency in our ludocapitalist era continue to draw upon similar aesthetic notions of game-playing, mobilizing concepts such as "serious games" and "gamification" around the aesthetic value of game-playing in popular culture to serve predetermined political or other more mundane material purposes. Such movements attempt to both essentialize and revalue a universal, progressive concept of particular kinds of game-playing in order to legitimate prescribed reorganizations of cultural and intellectual work. As a corporate game designer and futurist thinker, McGonigal is both representative of this shared worldview of contemporary game design practice as a powerful tool for social change, and unique in the extent of her idealistic enthusiasm for a more positive future engineered and optimized in its image. In *Reality is Broken*, McGonigal tells the story of the progressive work of game designers as the world's greatest "happiness engineers," and their unprecedented rise to power and status as the vanguard of the growing digital games industry. Through their historically unparalleled ability to create flexible, fun approaches to reorganizing society's modern

institutions and develop novel, collaborative, interactive solutions to complex global problems, McGonigal claims that the class of game designers she represents has the unique potential, if not a social and ethical mandate, to leverage the power of the games they design to remake the world for the better: "Life is hard, and games make it better. Organizing large groups of people is also hard—and games make it easier" (Conclusion). In particular, the progressive work of game designers McGonigal champions avoid engaging political questions of cultural struggle, critique or messy revolutions, and are rather a matter of objectively engineering products and services that provide corporate-friendly happiness from within our existing industrial organization: "The [commercial game] industry has consistently proven itself, and it will continue to be, our single best research laboratory for discovering new ways to reliably and efficiently engineer optimal human happiness" (Conclusion).

As one of the more popular exaltations of modern game design, McGonigal's ludic message is a compelling example of the persuasive, universal appeal of game-playing idealism today. Through a transvaluation of the public value of games combined with a populist message, e.g.: "We are living in a world full of games and gamers" (Introduction), McGonigal constructs a ludic Utopia, imagining the future modeled after an aesthetic ideal of game-playing:

> What if we decided to use everything we know about game design to fix what's wrong with reality? What if we started to live our lives like gamers, lead our real businesses and communities like game designers, and think about solving real-world problems like computer and video game theorists? Imagine a near future in which most of the real world works more like a game. But is it even possible to create this future? Would it be a reality we would be happier to live in? Would it make the world a better place? (Introduction)

In her vision of a new, more game-like reality principle to replace everything that's wrong in our broken reality, McGonigal's argument unwittingly parallels that of German idealism, a ludic Utopia echoing Schiller's vision of an aesthetic state,

grounded in an experience of game-playing fundamental to human nature, that can make the ideal society a reality that "carries out the will of all through the nature of the individual" (Schiller 138).

Despite the potential for such game-playing idealism to inspire revolutionary politics or a challenge to a repressive status quo through art, its ready mobilization of aesthetics can harbor similar dangers of an unaligned politics that we saw in the previous discussion of realist philosophy. In contrast to the realist disavowal of any humanistic moral ground to which a politics can be linked, an idealist position explicitly links humanist aesthetics to political action; however, the idealist's symbol of humanity is often a mythical figure or programmatic psychology, rather than a more democratic or dialogic morality tethered to human history, or a more diverse concept of cultural or social totality. For Schiller, the totality of human nature is contained in the symbol of beauty found in Greek culture from which modern man, wounded by the fragmentation of the individual in modern culture, had fallen.[7] For McGonigal, this totality is contained in a positivist psychological science of happiness, which posits a set of universal, apolitical and ahistorical "genuine human needs that the real world is currently unable to satisfy" (Introduction).

Summing up the last two sections, we can distinguish a materialist critical ludology from the dangerous tendencies of an object-oriented realism represented by Bogost, and a play-idealism represented by Schiller and McGonigal. With these distinctions in mind, in the next section I will offer some positive indications as to what a materialist ludology might look like by focusing on the conditions of digital play in contemporary technoculture, and offer some suggestions as to how to move the development of a ludic posthuman subject forward.

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[7] Jung comments on Schiller's aesthetics that "only an incorrigible idealist and optimist could conceive the 'totality' of human nature as simply 'beautiful.' . . . From this conceptual immaturity and inadequacy, . . . it is not at all clear how this mediatory state shall be established" (Jung 161).

1.3   Digital play and the Ludic Posthuman

Earlier I briefly discussed the limitation of game-playing ontologies, in that any such essential ontology of games reflects an implicit aesthetic judgment privileging particular forms of activity among others. If we assert that games require quantifiable outcomes or a goal, for example, our perspective would marginalize works that leave open the interpretation of player intention or evaluation of outcomes. If our concept of game requires a system of well-defined rules, then we would fail to recognize playful activities that emphasize improvisation, ambiguity or indeterminacy. If we stress the voluntary nature of games or the player's necessary emotional attachment, we might suppress discourses on addiction or compulsive gaming, or coercive or professional play. If we emphasize an essential distinction between work and play, or stress the safety of games and their insulation from real-world consequences, we might turn a blind eye to social practices which attach material or social rewards or consequences to game-playing performance, or which incorporate games into productive labor practices or market economies of exchange. If we stress the element of competition or conflict in games, then we might marginalize those games in which cooperation, coordination or creative expression are instead emphasized (such as the games of DeKoven's New Games movement).

On the other hand, a deconstructive delimiting of ontology is not to say that an equally prevalent "anything goes" approach to game-playing discourse would be any more productive. As Wilson notes,

> in some critical discourse play and game concepts seem to behave like magic motifs in traditional folk literature in that, like an endless sausage, an unstinting goose, or an unemptiable bowl, they not only dominate the other elements in the scene but are ontologically inexhaustible, swallowing, like black holes, all other analytic lexica. Once one has the concepts of play and game firmly in hand, it might appear unnecessary to talk about anything else and, for that matter, anything else may be

talked of in precisely those terms. Play and game can fill the conceptual horizon. (7)

In 2006, this problem of a debilitating game studies pluralism had become a central concern of the digital game studies community. In the inaugural issue of the journal *Games and Culture*, Patrick Crogan criticized what he saw as a naive pluralism taking shape, in which "different conceptions of the object of study operate in the various disciplinary and regional configurations of academic communities interested in computer games," a method that "tends towards Babel and not toward a synthesizing perspective on what underlies this diversity" (73). In order to resist such neutral orientations to contemporary technoculture that emerge through such an uncritical embrace of pluralism, Crogan argued, the question that animates the study of computer games must be posed as the question of the nature of computer games as part of "life" in contemporary technoculture:

> [T]he thinking of technocultural forms, including all those emanating from today's defining technology, must also always be led to an interrogation of technoculture, culture, technology, and "life" today and into the future. For every thing "we" make—computer games themselves and the research we do about them (which also "makes" them)—is an answer to the question of "life." (76)

In his own anthropological response to the field's ontological crisis, Malaby offered an understanding of games as grounded in human practice and fundamentally processual (while not essentially procedural), providing his own definition of game-playing as "a semibounded and socially legitimate domain of contrived contingency that generates interpretable outcomes" (96). He links social self-understanding to the type of activity recognized as play, hedging on any further essentialist delineation. This emphasis shifts the central question of play from an ontological tug-of-war towards observing the local processes by which particular play-forms become socially legitimate among

its players. To study a game as a game is merely to recognize a particular "form of life" as socially legitimate.[8]

A critical ludology that takes game-playing as an organizing metaphor for its own knowledge-practice, then, should reflect on both the grounding of knowledge and the exhibition of moral and political freedom in the concept of humanity enacted through its material. When we define, discuss or play games, we are forming the conditions through which our discourse is able to observe and construct the type of activity such games make possible. As both Schiller's aesthetic state and McGonigal's re-engineered reality demonstrate, ideals of game-playing are no frivolous matter and can evoke an unparalleled enthusiasm, or terror, particularly from those whose marginalized voices or activities are not recognized as normative, legitimate forms of play matching particular ideals.

Posthuman Play Aesthetics

How, then, can we articulate the forms of life underlying digital game-playing without falling back upon neutral forms of technocultural validation? In addition to historical contextualization, we might contribute to an aesthetic of digital play neither in relation to a fixed Greek ideal of human beauty nor a mass-psychology of computer-engineered happiness, but to a "posthuman" subject (with perhaps greater emphasis on "human" than on "post-") that is something more socially conscious, politically capable, and materially diverse. Based upon the work of critical media theorists including Poster and Hayles, I argue that a posthuman subject includes a critique of the computational imaginary alongside the idealized concept of play.

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[8] The expression "form of life" [*lebensform*] comes from Wittgenstein's discussion of language-games in *Philosophical Investigations*: "To imagine a language means to imagine a [*lebensform*]" (7ᵉ), which I find echoed in Crogan's and Malaby's positions.

In his earlier work on potential avenues of critical reflection for poststructuralist ethics and politics in the emerging milieu he identified in the title of his work *The Mode of Information*, Poster problematized the burgeoning field of computer science's foundation on the computing machine as both subject and object:

> The computer stands as the referent object to the discourse of Computer Science. As such it is in the position of the imaginary, the mirror of this science's false recognition and is invested with great signifying power, inscribed with transcendent status. I mean by this that Computer Science is to some degree dependent on computers in the way a child is dependent on its mother. The computer scientist cannot escape the relation to the computer; his or her identity is bound up with the computer. As the field of Computer Science develops, constituting the computer scientist in ever new ways through disciplinary practices, the relation to the computer remains one of misrecognition. Since Computer Science found its first identity through its relation to the computer, that identity remains part of the disciplinary protocol of the field, even if the actual object, the computer, changes significantly, even unrecognizably, in the course of the years. (147)

Poster proceeds to characterize Computer Science in terms of its ideological function:

> Computer Science then is then a discourse at the border of words and things, a dangerous discipline because it is founded on the confusion between the scientist and his or her object. The identity of the scientist and the computer are so close that a mirror effect may very easily come into play: the scientist projects intelligent subjectivity onto the computer and the computer then becomes the criterion by which to define intelligence, judge the scientist, outline the essence of humanity. . . . The imaginary foundation of computer science is, . . . essentialized as a closed discourse whose domain is spirit. (148)

A posthuman figure more capable of resisting instrumental reason must be formed from an ensemble of the social conditions that produced not only the closed, transcendent discourse of the computer, but also its formative historical and social context that provide the conditions for an alternate discourse or critique. This position is occupied no longer by the classical liberal humanist subject that Schiller found in the Greek ideals of beauty, but rather by what Poster calls in his later work

a "humachine": a fluid, social assemblage of humans and machines, unassailable to the subject/object distinction attributed to the relation between human and machine-as-tool that was possible in earlier media eras (*Information Please*). Far from being determined by universal forces of technological progress, however, Poster's concept of the humachine is still linked to history, culture and social movements, imbued with the potential for ethical-political action which demands critical attention and recognition in order to develop the corresponding public institutions to support them.

Hayles narrates a similar critical moment in contemporary technoculture through the more conventional term, "posthuman":

> I understand human and posthuman to be historically specific constructions that emerge from different configurations of embodiment, technology, and culture. My reference point for the human is the tradition of liberal humanism; the posthuman appears when computation rather than possessive individualism is taken as the ground of being, a move that allows the posthuman to be seamlessly articulated with intelligent machines. (*How We Became Posthuman* 34)

Although her vision of the posthuman ambivalently contains both terror (the "post-" prefix signifying the threat, possible but not inevitable, of the End of Man) and excitement (e.g., in new human-machine configurations that could alleviate problems with our inherited liberal humanism and its privileging of the disembodied subject), Hayles's ethical aim is for contingent posthuman becoming to be deliberated and crafted into a sustainable narrative that ensures our collective survival without reproducing structures of domination and oppression:

> I view the present moment as a critical juncture when interventions might be made to keep disembodiment from being rewritten, once again, into prevailing concepts of subjectivity. . . . If my nightmare is a culture inhabited by posthumans who regard their bodies as fashion accessories rather than the ground of being, my dream is a version of the posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude as a condition of

human being, and that understands human life is embedded in a material world of great complexity, one on which we depend for our continued survival. (5)

Critical concepts of the posthuman subject offered by Poster and Hayles both embrace new technological configurations while disputing any essential claim of computation as the ground of being, instead remaining receptive to alternate modes of literary thought, cultural tensions, and social struggle. I link these figures of the posthuman subject to game-playing activity by focusing on the material history of production and validation of forms of play that are either encouraged or suppressed in social-technical environments.

Kline, Dyer-Witheford, and de Peuter offer such a promising historical-materialist model of the dominant dynamics of contemporary post-fordist, postmodern information capitalism in *Digital Play*. Within a Marx-inspired circuit of capital production, commodification and consumption, they posit three interpenetrating cycles (or subcircuits) of cultural, technological, and marketing activity that characterize the contemporary field of production in the mediatized, global marketplace. Each of these cycles involves its own dynamic circulation of capital, channels and networks of communication and feedback, evolution of technical forms and processes, and emergent contradictions and crises. The circuit of technology is constituted by a relation between programmers and users structured by the medium of computing platforms; the cultural circuit is constituted by designers relating to players through the medium of games; and the marketing circuit is constituted by marketers and consumers relating through the medium of commodities. In this multifaceted model, the production of free play that would constitute an emancipatory posthuman potential is constrained by the more dominant construction of a gamer-subject interpellated by the overlapping circuits of capital. Here, the gamer is already preconfigured as a "player" within the cultural circuit of meanings prescribed by a professionally-designed procedural fiction,

legally protected by international copyright and trademark registrations; as a "user" within a proprietary technological platform tailored toward the efficient, one-way distribution of authorized content in exchange for payment (or for the exchange of other monitored and monetizable value, as in the case of social network activity for example); and finally as a "consumer" within mediated distribution channels saturated with advertising, sales and cross promotions encouraging more frenzied and friction-free habits of consumption.

A critical ludology fits well alongside Kline, Dyer-Witheford, and de Peuter's analytical framework. The free play that is the focus of such a critical perspective is located outside the hegemonic flows of technocultural capital, or found within its moments of crisis or contradiction. Such play resists the instrumental rationality of capital accumulation and promotes democratic freedom for the great masses of gamer-subjects, whose forms of life are never freely at play, but are firmly constituted within the matrix of technical platforms and flows of capital. As opposed to the capital-intensive flow of commodified creativity produced by the commercial videogame industry, the type of free play described by its critique is to be found in aberrations or distortions of these cycles of ludocapital.

It is tempting to applaud an expanding sphere of popular game-playing activity promoted by industrial forms of game production, expanding the social impact of its creative energies to the corporate arena of capitalism through gamification and serious play initiatives. However, such game forms, motivated by a politically-neutralized, discourse of games and a focus on the instrumental deployment of procedural rhetoric within corporate-controlled digital media platforms, are already overdetermined by the institutions underwriting their production. We must look for the ethical possibility of posthuman free play elsewhere.

Paying attention to this notion of free play, in the next section I juxtapose brief inquiries into the aesthetics of Second Life and Minecraft, both game-like software

projects but each also located outside the circuits of industrial entertainment, that offer glimpses of free play in their alternate and contrasting visions of posthuman subjectivity.

1.4   Case Studies

Homo Lindens: Second Life and Virtual Entrepreneurship

Second life is an open-ended, three-dimensional virtual world environment initially launched in 2003 that has generated extensive interest from the academic community. Public interest in the project peaked sharply around 2007 (Google). Although similar in some aspects to other persistent-world multiplayer games such as World of Warcraft and Everquest, Second Life was novel in two fundamental respects. First, Second Life lacked both an explicit goal or any hierarchical representations of power, wealth or status, instead encouraging its users, hailed as "residents" by its development studio Linden Lab, to interpret Second Life as its name implies, an alternative living space of everyday experience. Second, the world of Second Life explicitly facilitated works of end-user creativity, entrepreneurship and commercial exchange through experimental innovations in end user licensing agreements, content-creation tools and interfaces, and regulated virtual currency exchange markets.

Malaby observes that the impact of game culture on our society has truly risen to prominence as a post-bureaucratic response to traditional organizational forms. Games, he suggests, are a source of organizational (dis)order that have proven a useful trope for the meta-management of complexity, a trope that affects not only the product of game development but also the production process itself. The particular aesthetics of free play that Second Life embodies is therefore most visible only when the virtual world is placed alongside the real-world corporate culture which owns, manages and produces it. In *Making Virtual Worlds*, an ethnographic study of the

parallel construction of Second Life alongside the dynamic, playful organization of Linden Lab, Malaby does just that, linking the "dual projects of Second life and Linden Lab as sites for individual, autonomous creativity for whom technology was a handmaiden" (78). Alongside the production of a virtual space in which a certain model of an individual creative subject was facilitated through technology, he observes a parallel ideology underlying the organization of Linden Lab itself. With this duality in mind, he develops his observations into the critical notion of "technoliberalism," denoting a dependency on technological tools for solving social and policy concerns: "Faith in the tool-making tool of computer programming practice served as the go-to practical means by which a public policy problem could be answered" (78).

Second Life's website enthusiastically embraces a rhetoric of freedom and autonomy: "Enter a world with infinite possibilities and live a life without boundaries, guided only by your imagination" (Linden Research). This rhetoric of technologically-facilitated individual and autonomous creative freedom, at work within both Second Life and Linden Lab, masked the unspoken, pervasive systems of implicit control Malaby saw within Linden Lab's internal decision-making practices as well as in the virtual world's construction. For example, espousing an office rhetoric of flat organization devoid of hierarchy, everyone's opinion at Linden Lab was encouraged and said to be given equal treatment. However, in the end according to Malaby, decisions were made according to the most "obvious" decisions based on what was "cool"—an unspoken dynamic of cultural capital that ran along informal but identifiable lines of power, typically culminating in the personal affinities of the company's CEO. In a similar fashion, the consumption-oriented, free-market capitalism promoted within Second Life was itself cultivated through programming, a technological mechanism of regulation that was fixed and unquestionable except through appeal to the engineers in charge of the code.

The boundaries of this form of free control are made particularly evident within the Second Life world through two primary tensions, which combined demonstrate the aesthetic orientation of the project in general. First, Linden Lab found itself in the contradictory situation of promoting open-ended entrepreneurial activity within its virtual world, while making various efforts to control the brand and message of this activity when it reflected poorly upon the service or conflicted with its public message. Second Life's culture of private property ownership and marketplace-oriented transactions of virtual goods was an innovation that resulted from Linden Lab's deliberate shaping of the legal and computational architecture of its virtual world. Linden Lab was progressive in its stated policy not to claim ownership of the creative works of individuals within their platform, and it could be said that this policy comprised one of the driving missions of the project from the start. Indeed, it was a bold and unprecedented move to treat creative activity within its virtual world with similar intellectual property protections as in the real world.

It is only against the backdrop of games understood as privatized, regulated spaces of overdetermined entertainment, refusing to grant any autonomy to its player-consumer audiences, that the uniqueness and constructedness of the legal protections that Linden Lab granted its "residents" can be recognized. World of Warcraft, for example, consistently asserts its contractual ownership over any creative activity conducted within its game environments. It is notable that this playful concession of rights to its players makes Second Life something other than a "game." No longer hermetically sealed within a self-contained, rigorously policed ludic fiction, Second Life's "residents" were not only permitted but encouraged to construct hybrid social and professional identities, transferable between creative work performed in-world and the larger economic activity of the "First Life" surrounding it.

However, constraints upon this novel entrepreneurial freedom were not far below the surface. Commenting on the predominance of consumer fashion in Second

Life, Malaby notes that "potential new users are told that they can 'enjoy being whatever they want in Second Life,' but for most of them this seems to involve buying clothes and other items that thousands of others have bought as well" (*Making Virtual Worlds* 114). Entering Second Life in early 2013, my own experience confirmed impressions of an electronic shopping mall. Virtual clothing store buildings were the most common in-world attraction, where displays of the latest designer clothing and accessories hung on the walls, available for purchase with a couple button clicks and a few hundred Linden dollars. For more conventional (and efficient) e-commerce shopping, the Second Life website prominently featured a marketplace with over two million virtual items listed for purchase. Digital rights management was coded as an inviolable, "natural" law of the virtual world itself, allowing every object for sale to be individually marked with automatically-enforced permissions on "copy," "modify" and/or "transfer" operations, technically limiting the ability of users to creatively reuse items beyond their intended purpose as commodity objects. This commodified consumerism was "an inescapable value written into Second Life," Malaby notes, with its system of intellectual property rights a "core attribute of Second Life" that "so easily serves both the ideal of empowered creation and the ideal of consumption" (115).

The second primary tension of Second Life's free control is found in its system architecture: despite a rhetoric of openness that allowed it to gain a great deal of traction among academic, corporate and educational institutions, the physical, real-world location of Second Life, as a networked grid of computing servers that mapped to two-dimensional coordinates in the Second Life world, was closely guarded by Linden Lab as a private resource and a key component of a business model that involved selling fixed portions of virtual real estate to universities, corporations, and high-profile investors. The price of land that only Linden Lab had the legitimate authority to create by fiat is the primary sovereign force in its virtual world. The

proprietary development of Second Life's servers meant that development of technical capabilities within the virtual world were limited to Linden Lab's engineers, the "gods" of Second Life, and their feature priorities.

Although efforts to free the boundless creative potential of Second Life's proprietary metaverse from its sovereign benefactors have been ongoing in projects such as OpenSimulator, such open-source development efforts have yet to develop a critical mass around their message, as the appeal of a network that aims to interoperate with Second Life but with a more open, flexible or customizable technical architecture seems to fall flat. I think the problem is that such efforts are unable to venture far enough from the commodified entrepreneurial ethos of Second Life as a reference point of the system's design. With Second Life's construction of the producer-consumer relationship as its constraining posthuman vision, such attempts to create an interoperable open-source server have not engaged the small community satisfied with the official, corporate-controlled Second Life experience, and have been equally uninspiring to those seeking radically different models of networked computer-mediated interaction, collaboration, perception and construction from what Second Life has been able to offer.

With Second Life, Linden Lab presented an experimental vision of digital liberty with an aesthetic of free, creative labor mediated through a loosely-regulated market of virtual goods. Next, I contrast this vision of posthuman subjectivity against the more popular, gamer-oriented phenomenon of Minecraft, and the very different aesthetic of free play in creative production it enacts.

Minecraft: Neo-Renaissance Craftsmanship

Minecraft is a software project more well-known among mass-market digital gamers than Second Life, though like the latter, its open-ended aesthetic also doesn't overtly prescribe a unilateral goal upon its players and therefore presents an anomaly to

formal game ontologies. Minecraft was originally conceived in 2009 by an individual game developer, Markus Persson, as a side project while employed for another game company. As early beta releases of Minecraft became hugely popular, Persson quit his day job and founded a small company, Mojang, to develop Minecraft and other independent projects. As of 2013, Minecraft has become one of the best-selling computer games of all time.[9] In this section, I will describe how Minecraft's combination of amateur creation-oriented interaction mechanics, intentional lack of virtual economy, and open-authorship development ethos combined to create an aesthetic of neo-Renaissance craftsmanship distinct from the entrepreneurial model of Second Life.

Mine and Craft

Drawing broad inspiration and specific game mechanic conventions from a mix of various commercial and "indie"[10] game influences, the core gameplay of Minecraft involves navigating an abstract, brown-haired human avatar through rustic, three-dimensional landscapes and dark underground dungeons, interacting with the environment's assortment of static blocks and dynamic creatures, and producing and collecting a limited inventory of resources and items arranged in a balanced hierarchy. The game exhibits a somewhat standard set of conventional action-fantasy/role-playing gaming mechanics: health points and combat, food and

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[9] On 15 September 2014, Microsoft announced that it would be acquiring Mojang and its Minecraft franchise for $2.5 billion ("Minecraft to Join Microsoft").

[10] "Indie game" is a term loosely distinguishing a cultural product less dependent upon dominant production organizations and mechanisms. The term has been gaining currency within the game industry in recent years as a result of rapid transformations in game production models (such as digital distribution and crowdfunding), having displaced the term "independent game" around 2009. However, much like the "independent films" actually produced by conglomerate-owned subsidiaries, the "indie game" can also merely indicate minor distinctions along audience, distribution, funding/budget, or stylistic lines rather than indicate a complete financial or cultural independence from industry conventions. See Parker's "Indie Game Studies Year Eleven" for a survey of the growing literature on indie games.

hunger levels, graded tiers of weapons, armor and durability, experience points and levels, and magical statistical modifiers in the form of potions and enchantments.

Two key game mechanics set Minecraft apart from most canonical "dungeon crawlers" of the action-fantasy genre, aptly comprising the game's title: mining and crafting. Both of these mechanics derive from the game world's striking visual aesthetic comprised of large unit cubes or "voxels," each block half the height of the player and texture-mapped with simple, low-resolution images. Every block that comprises the terrain can be destroyed or "mined" with tools linked to simple narrative fictions aiding the process (an axe can be used for breaking wood, pickaxe for stone, shovel for dirt, etc). The most valuable resources used to create advanced equipment are rare metals such as iron and diamonds, found randomly deposited throughout the underground landscape. In order to find these treasures, the player must carve out large, winding caverns through the underground landscape, search for and collect treasures, and then return to a home base to deposit loot into permanent storage, upgrade equipment, and repair and expand the base.

To mine, a structural block is broken with a single mouse button press. The resource can then be collected in the player's inventory, and this resource can be used to place a new block anywhere in the environment (adjacent to another block) with another single mouse click. This mine-collect-craft feedback loop, where mined resources are then repurposed to create functional structures ranging from simple shelters to elaborate central outposts, comprises what might be seen as the essence of Minecraft's gameplay. This feedback loop of explore, collect and create is mapped to a series of simple narrative fictions, with recognizable mechanics derived from fantasy computer game conventions such as progressing through a hierarchy of increasingly-powerful items, and discovering and collecting rare and special resources. However, in the process of engaging such simple, standard conventions, more open-ended, creative possibilities of inhabiting Minecraft's world present themselves.

As bases and cave tunnels expand, the player must creatively organize their spatial activity through increasingly creative constructions. At first, these might be simple, prescribed creations such as an enclosed shelter to keep out randomly-spawned monsters, or a second floor to maximize the use of space. As such functional creations expand in complexity, they can take on an individual character of self-expression. Through video recordings shared on Youtube and through special "creative" game servers, players have constructed and showcased enormous, elaborate dwellings built up from the basic blocks, and on wikis and forums, players share their blueprints for elaborate mechanisms of automatic resource production. On this scale, Minecraft can begin to be viewed as a creative tool with similarities to Second Life's own building-construction interface, though designed as an intuitive tool for the amateur craftsman rather than complex design software for the professional entrepreneur. Blocks become three-dimensional units of Lego-like construction, the infinitely-generated terrain becomes a spatial canvas, and the player's avatar becomes an intuitive first-person interface, where selections and modifications are performed simply by pointing, building or destroying.

Creative Mode

Second, beyond the game mechanics, Minecraft also cultivates its ethos of the amateur craftsman through a complete absence of any functional virtual economy in its default environment, in stark contrast to Second Life and most other commercial virtual worlds. This lack is intentional, and can be attributed to two aspects: an open server model where the server application was made public so anyone could easily create and manage their own privately-run game environment, and a "creative mode" gameplay option that enables the avatar to fly quickly through the virtual space and bypass most of the restrictive, time-consuming mechanics present in the "adventure" mode such as resource requirements for creating blocks and items or limited travel speeds.

Both of these aspects facilitated the removal or modification of any artificial in-game constraints, so that nothing in the Minecraft experience was bounded by a player's labor that could be exploited in a virtual economy of any significance.

In contrast to the academic enthusiasm for and interest in isolated, game-specific "play-labor" economies in online multiplayer games such as World of Warcraft, I believe there is a distinct freedom to be found in software that structurally eliminates the pernicious effects of human labor captured within artificially-regulated systems under rhetorics of play as entertainment. Within Minecraft, it's still possible for third parties to create their own managed, isolated economies (by running a customized server with the appropriate "mod" software installed), but such micro-economies are more recognizably fictional (and harder to integrate into globalized systems of ludocapitalist exploitation, as in the gold-farming operations conducted in World of Warcraft) since they are voluntarily adopted rather than unavoidably endured by all players for the sake of preserving a game's authorial integrity. In other words: rather than ethically construing intentionally bypassing resource or spatial constraints as "cheating," Minecraft's game-playing aesthetics instead presents the player with freedom to voluntarily enter and exit those constraints at will as one of the values consistent with its system.[11]

Public Authorship

Minecraft exhibits a novel model of cultural production I see as *public authorship*, a model in which an engaged audience is not only authorized but is actively encouraged to openly interact with an authored, fictional world as a literary starting point for their own interpretations, modifications, and creations. I recognize two distinct sides

[11] As Consalvo describes in *Cheating*, the discourse of cheating is a social-technical, value-laden negotiation of power and agency among players and industry actors in and around game-playing media, and different attitudes towards cheating can reflect various nuanced ethical relations to "gaming capital" (2).

of such public authorship, both of which represent a break from prior models of commercial game development: a public orientation of the author's own iterative development process, and a public orientation of the audience's own software modifications and expressions of derivative works.

Minecraft's development history begins with a moment of amateur appropriation, as a self-acknowledged "clone" of another recently-released amateur game, Infiniminer: on 13 May 2009 (weeks after Infinimer's public release on April 29), Persson posted a video to YouTube titled *Cave Game Tech Test*: "This is a very early test of an Infiniminer clone I'm working on. It will have more resource management and materials, if I ever get around to finishing it" (Persson, "Cave Game Tech Test"). Minecraft was subsequently developed in full public view, with a first public prototype released less than a week after the first video, and tech demos regularly appearing on YouTube. Starting in December 2009, Persson started making all ongoing in-development ("indev") builds of the game available to players who placed preorders. Between the two-year development process from first prototype to the release of Minecraft 1.0 in November 2011, Minecraft had already become popular enough from preorder sales to guarantee the game's success.

The unlikely amount of enthusiasm within the player community for modifying the game software was largely unanticipated by Mojang, but it has become one of the most interesting and prolific aspects of the game and is in many ways inseparable from the Mojang-authored object itself. Today, much of the ongoing creative production surrounding Minecraft is developed and supported through an enormous, informal "mod" community producing software that extends and rewrites the game's operation. The unintended nature of the mod community is demonstrated whenever Minecraft version updates are released that break the functionality of existing mods, and it is ultimately left up to the community to adapt its offerings. (Mojang has a more organized API under development.) Aside from

software modifications, the Minecraft community's public orientation is also exhibited through the vast proliferation of user-generated Minecraft content on YouTube, encouraged by Mojang as a form of free promotion. In his study of "Minecraft as Web 2.0," Lastowka identifies this community-generated content as a fundamental component of Minecraft's production logic: "Players use Minecraft's software as a locus for generating their own creative content both in the game and outside of it. . . . Their creations work in lieu of traditional advertising by popularizing the game with new users and adding to the game's value" (10).

Despite this open orientation of public authorship, Minecraft is still a traditionally-authored product of today's information economy, packaged and distributed as proprietary software, with payment verified through server-side digital rights management required to play. However, beyond this conceit, Mojang marks a radical departure from mainstream practices of cultural property management through a hands-off approach to its creative property. So long as its players pay for its software, Mojang has encouraged the vibrant proliferation of code modifications, hacks and derived content, allowing its active community of players to continue to define the game's future public image and feature designs. While there are obvious options available (both technical and legal) that would more closely manage the Minecraft property to prevent or discourage derivative works or more strictly enforce unauthorized copying, Mojang has, if anything, gestured in the other direction. Persson has spoken out against excessive trademark litigation, donated money to the Electronic Frontier Foundation in support of patent reforms, and is a member of the Swedish Pirate Party. At the 2011 Game Developers Conference, he publicly encouraged players to pirate Minecraft if they couldn't afford the game: "Piracy is not theft. If you steal a car, the original is lost. If you copy a game, there are simply more of them in the world. There is no such thing as a 'lost sale'" (qtd. in Thier).

As one of best-selling computer games of all time, Minecraft has the luxury not to be as concerned about any "lost sale" as other moderately-successful creators struggling to make ends meet. This tension between Minecraft's amateur ethos and commercial success poses the question: does Minecraft's precarious popularity outline a reproducible, sustainable, model of anarcho-ludic aesthetic organization that captures some novel, playful elements of our posthuman, "Web 2.0" moment of digital media? Or is it merely an indie aberration, its commercialization representing a "selling out" all too familiar to subcultural production, a veiled betrayal of the amateur gamer community that provided it with design feedback, publicity, even direct inspiration (e.g., Infiniminer)? Persson personally struggled with this tension throughout the latter phase of Minecraft's development process, leaving Mojang's business operations and eventually Minecraft itself to other employees, returning to tinker with new creations. To the extent that it resisted its own commercial trappings, Minecraft can be viewed less as a digital game-product to be consumed and more a digital playground, a space of free play less recognizable as a singularly-authored game than as a flexible component of open-ended cultural possibility.

To summarize, I characterize the model of free play that Minecraft exemplarizes as an expression of an idealized model of craftsmanship derived from a Renaissance view of work. This model, sharing broad affinities with such entities as Lego building blocks, O'Reilly Media's *Make* magazine, and Stewart Brand's *Whole Earth Catalog*, has developed into a compelling rhetoric of play in recent decades, which I interpret as a popular response to an increasing professionalization of technical expertise in modern society. In his 1951 work *White Collar*, Mills summarized this ideal model of craftsmanship as involving six major features:

> There is no ulterior motive in work other than the product being made and the processes of its creation. . . . The details of daily work are meaningful because they are not detached in the worker's mind from the product of the work. . . . The worker is free to control his own working action. . . . The craftsman is thus

able to learn from his work; and to use and develop his capacities and skills in its prosecution. . . . There is no split of work and play, or work and culture. . . . The craftsman's way of livelihood determines and infuses his entire mode of living. (220)

Mills laments that "none of these aspects are now relevant to modern work experience" of mid-twentieth century American white-collar workers, describing it as "an anachronism" to be upheld as an "explicit ideal" against which the conditions of modern work can be negatively contrasted (224). Within contemporary ludocapitalism, however, this very ideal of craftsmanship is being reintroduced into digital cultures through a rhetoric of play viewed not as the refusal of or freedom from work, or as begrudgingly coexisting alongside work (as in a labor/leisure divide, or craftsmanship as a "hobby"), but as an ideal of authentic creative production from which new posthuman forms of life might emerge. Minecraft was both formed by and is an exemplary expression of this cultural ideal, as evident in the game's title ("-craft") and by Persson's own public struggles to maintain an authentic, autonomous relation to his own craft following Minecraft's massive success: "Turns out, what I love doing is making games. Not hyping games or trying to sell a lot of copies. I just want to experiment and develop and think and tinker and tweak. . . . So that's what I'm going to do" ("So That's What I'm Going to Do").

1.5   Conclusions

Although neither Second Life nor Minecraft is a sufficient or complete answer to Crogan's question of the nature of computer games as part of "life" in contemporary technoculture, I believe my comparison illuminates the role of the concept of game-playing in framing posthuman subjectivity. Through ensuring intellectual property protections to its "residents" and giving them tools to make and sell their own virtual goods, Linden Lab's Second Life presents an aesthetic model of the

technoliberal, entrepreneurial subject that it simultaneously bred within its own corporate culture. Through its public web-based development process, sandbox-style gameplay radically open to player modifications, and its rejection of the anti-piracy rhetoric of the game industry, Mojang's Minecraft presents an aesthetic model of a neo-Renaissance communion of player-craftsmen, simultaneously playing in and playing with an openly-shared, collective culture. I have also pointed out how each model contains its own contradictions consistent with its own ideological model—Second Life in its God-like control over the legal and technical limitations of its virtual economy; Minecraft in its unabashed cloning of Infiniminer's unique visual aesthetic and game mechanics and in its enormous commercial capitalization of an amateur player community. Each software project gestures towards an aesthetic presentation of posthuman subjectivity encouraging a degree of individual autonomy that many other games, and many other ways of talking about games, lack entirely.

The critical ludology attentive to game-playing aesthetics that I elaborated in this chapter leads us away from the violence of essentialist classifications of game objects: not toward a black hole of realist speculation where everything is the play of the world, nor toward an idealism where play is a narrowly-specific form of essentially human experience, but toward a thinking of free play as presenting the ethical and political goals we hope to achieve through the precarious balance of necessity and freedom in the game-playing forms we create, observe and inhabit.

As I began to touch upon through the examples in this chapter, one of the central facets of our posthuman environment that structures our notion of what a digital game object is and how it should be produced and consumed within our society, a facet undergoing regular transformation and facing mounting political debate, is the liberal concept of property and its contemporary expansion into a global regime of intellectual property. My next chapter will examine the legal discourse and social tensions surrounding this constitutive value of the ludocapitalist paradigm

more closely through the ironic socio-legal corporate history of Tetris, a popular game now counted among the world's most valuable and vigorously protected intellectual property brands.

Chapter 2

Specters of Play: Hauntology of Tetris®

Tetris enslaved my brain. At night, geometric shapes fell in the darkness as I lay on loaned tatami floor space. Days, I sat on a lavender suede sofa and played Tetris furiously. During rare jaunts from the house, I visually fit cars and trees and people together. Dubiously hunting a job and a house, I was still there two months later, still jobless, still playing. (Goldsmith)

A spectre is both visible and invisible, both phenomenal and nonphenomenal: a trace that marks the present with its absence in advance. The spectral logic is de facto a deconstructive logic. It is in the element of haunting that deconstruction finds the place most hospitable to it, at the heart of the living present, in the quickest heartbeat of the philosophical. Like the work of mourning, in a sense, which produces spectrality, and like all *work produces spectrality. (Derrida,* Echographies of Television *117)*

Introduction

In this chapter, I present the commodity form of the videogame as a key aspect of the political-economic structure of ludocapitalism through a case study of Tetris.

First, I start from the existing academic canonization of Tetris as a paradigmatic object among videogame formalists, and develop an allegorical reading emphasizing the game's visual expression of spatial-temporal mechanics, which produces a human cognition of algorithmic space comprising a cognitive mapping functioning as a symbol of the computerization of everyday life.

Second, I extend this structural reading of Tetris's construction of game-space through a social-historical interpretation of the game's construction of commodity-space within digital capitalism, as a vigorously marketed and litigated billion-dollar brand. Here, I look at the habit-forming psychological character of Tetris play as a Benjaminian aura exceeding the ontological boundaries of the commodity form. I argue that the growth of the software industry and its expansion of intellectual property law across time and space have coerced basic components of intersubjective experience, such as the abstract operational rules of popular videogames like Tetris, into exemplary post-Fordist commodity forms.

Third, through a close reading of a recent lawsuit The Tetris Company won against an independently-produced variation of Tetris, I argue that the novel legal arguments justifying protection of the videogame commodity idealize "fun" while suppressing any latent "function" in the game object, revealing a tension between market-enabling conditions of property ownership and communicative conditions of intersubjectivity. This tension is predominantly *spectral* in the sense that Derrida examines in his reading of Marx's analysis of the commodity form.

Finally, I conclude by discussing substantive critiques of the modern intellectual property doctrine's liberal-humanist foundations from the field of critical legal studies, along with Derrida's thematic orientation of *hauntology* as deconstructive logic of ontological form, to form an ethical-political position that a posthumanist game criticism could adopt toward the ludocapitalist commodity form that Tetris represents.

The Ideal-Type Commodity Form

A central component of the liberal enlightenment subject is the figure of the possessive, individual property holder, of which Locke's labor theory of property is the canonical expression and Marx's social theory of value the classical critique. Locke held that the "great and chief end" of government is "the preservation of property," justifying an individual's right to an exclusive claim upon land and other natural resources according to his proportional application of human labor to the state of nature. In *Theories of Surplus-Value*, Marx recognized Locke's "classical expression of bourgeois society's ideas of right" as the "basis for all the ideas of the whole of subsequent English political economy" (XX-1293a; pt. 1, addendum, sec. 4). This comprised a primary target of Marx's critical work, which instead conceived the modern institution of property as reflecting particular, historically-specific social relations integral to the profit cycle of industrial capitalism.

Marx's twofold theory of value extended beyond the specific capitalist social structure of his age, providing the basis for future transitional models of capitalism's global structure. I use one such model to situate the political-economic structure of ludocapitalism alongside the era known as "post-Fordism," distinguished both from the previous Fordist era as well as from the classical form of industrial capitalism. From the mid-1970s, a cluster of Marxist-influenced social theorists known as the Regulation School theorized the emergence of a distinct "regime of accumulation" around the early twentieth century, marked by an increased emphasis on the marketing and distribution of mass-produced household goods to an expanding consumer society. They identified this distinct regime as "Fordism," exemplified by the Ford Motor Company's paradigmatic stewardship of the American automobile industry through a combination of tactics including a large-scale, vertically-integrated

corporate structure, Taylorist scientific management and assembly-line factories, and mass media marketing to an increasingly homogenous consumer middle class.[1]

While the Regulationists claimed that Fordism peaked around 1960 and has since entered a period of decline or crisis, debate has continued through recent decades around how best to distinguish the present "neo-" or "post-Fordist" regime of accumulation from its predecessor. In his study of consumer culture, Martyn Lee presents a Regulationist-influenced method of distinguishing the key characteristics of Fordist and post-Fordist periods through a study of the particular qualities and characteristics of the commodity form within each era. Starting from a Marx-influenced premise that the "real significance of the commodity" is that it tends to "reflect the whole social organization of capitalism at any historical and geographical point in its development" (112), Lee develops Weber's methodological concept of the "ideal type" to propose that for a specific regime of accumulation, a distinctive "aggregation of individual commodities which appear to share certain recognisable material and non-material characteristics" can be identified as the "ideal-type commodity form of the regime of accumulation" (119). Lee's method of analysis implies a strong correlation between a commodity form and a regime of accumulation, such that "the particular structural order of the spatial and temporal dimensions of a regime of accumulation, . . . is accordingly objectified in the major commodities of the period" (124).

Lee describes "standardised housing and the car" (129) as two paradigmatic commodities to emerge in the Fordist regime, combining to construct an ideal-type spatial and temporal experience of everyday consumer life characterized by "fixity, permanence, and sheer physical presence" (130). While the modern house provided a

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[1] Aglietta's *A Theory of Capitalist Regulation* is viewed as the foundational text of the Regulation School; see also Boyer's *The Regulation School* for an overview of the field's subsequent literature. Gramsci's notes from the 1930s on "Americanism and Fordism" provided the basis for recognizing Fordism as a paradigm for the era.

"stable space for mass consumption" as a standardized container for the vast array of consumer goods entering the household, the car complemented and mobilized the household by linking it to the "vast social network of consumption and welfare" including "schools, shopping centers, and the new leisure complexes" (129-30) all within driving distance of the home. As exemplary of Fordism's ideal-type commodity form, the car and standardized housing thus stabilized and regulated the spatio-temporal dimensions and rhythms of everyday middle-class life, subjecting it to a relatively homogeneous assortment of household goods and car-accessible social landmarks distributed throughout the modern American landscape.

For post-Fordism, Lee refers to "high-tech commodities," "information" commodities and "cultural services and events" (128) as examples of an ideal-type commodity form characterized by the "fluidisation of consumption" and the "freeing up of the previously static and relatively fixed spatial and temporal dimensions of social life" (133). However, Kline, Dyer-Witheford, and de Peuter, adopting Lee's model but finding his account of contemporary commodity forms inconclusive, instead propose that the videogame best represents the ideal-type commodity form for the present era. Videogames, they argue, "embody the new forces of production, consumption, and communication with which capital is once again attempting to force itself beyond its own limits to commodity life with new scope and intensity" (76).

In this chapter, I affirm and extend Kline, Dyer-Witheford, and de Peuter's provocation by presenting Tetris as a paradigmatic example of the videogame as ideal-type commodity form in post-Fordist capitalism. The central position of Tetris within the academic videogame canon as representing something abstractly essential to the videogame's experiential form has been well established within the subfield of game studies known as *ludology*, which I will cover in the next section.

2.1 Tetris as Symbolic Game Object

A Ludological Touchstone

To link my analysis of Tetris in particular to the videogame as ideal-type commodity form for post-Fordism in general, I depend upon a "touchstone" metaphor in two interrelated senses. First, I think of Tetris as a mechanism of comparative perception that Arnold once employed "for detecting the presence or absence of high poetic quality": the literary critic would "have always in one's mind lines and expressions of the great masters, and, . . . apply them as a touchstone to other poetry" (10). This sense of Tetris as a great work at the center of the videogame canon has been justified through the game's widespread popularity and commercial success, as well as the "prototypical," genre-defining status it had asserted within the subsequent casual game and matching-tile sub-categories of commercial software entertainment.[2] Second, I consider Tetris in the same way Lee describes the correlation between the contemporary commodity form and the material-cultural reproduction of everyday life: "the commodity presented itself as a vital touchstone, at once being the focus of national economic prosperity as well as providing an important material and symbolic resource by which ordinary people could, both materially and culturally, reproduce their life" (x). In this way, I frame my analysis of Tetris as the construction of a ludological touchstone: by interpreting the "meaning" of Tetris and investing this particular instance of the videogame's commodity form with symbolic significance, I aim to present a cultural symbol of ludocapitalism itself.

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[2] See Juul's *A Casual Revolution*: "It could also be argued that the 1985 Tetris was the first casual game" (27); Tetris is at the top of a "family tree of the history of matching tile games. . . . Tetris was an extremely successful game that spawned a number of imitators" (86–7); "For a long period of time, matching tile games were considered derivatives of Tetris, which was given the status of a prototype game" (98).

I begin my analysis of the meaning of Tetris at the moment that Tetris was first canonized within academia as a central symbolic object of contention, the "ludology vs. narratology" schism that occurred in the infant years of computer game studies from 1997 to 2004. In 1997, Murray's *Hamlet on the Holodeck* subordinated games to stories within a broader neo-Aristotelian aesthetics of the digital storytelling medium, advancing the view that "A game is a kind of abstract storytelling. . . . Every game, electronic or otherwise, can be experienced as a symbolic drama" (142). Reiterating the anthropological view of games as "ritual actions allowing us to symbolically enact the patterns that give meaning to our lives" (143), Murray offered a unique reading of Tetris in advancing the position that beyond symbolic drama, "Games can also be read as texts that offer interpretations of experience":

> Even a game with no verbal content, like Tetris, . . . has clear dramatic content.
> In Tetris, . . . success means just being able to keep up with the flow. This game
> is a perfect enactment of the overtasked lives of Americans in the 1990s—of the
> constant bombardment of tasks that demand our attention and that we must
> somehow fit into our overcrowded schedules and clear off our desks in order to
> make room for the next onslaught. . . . Tetris allows us to symbolically experience
> agency over our lives. It is a kind of rain dance for the postmodern psyche, meant
> to allow us to enact control over things outside our power. (143–4)[3]

I find this reading of Tetris, as an allegory for the psychology of everyday life within American post-Fordist capitalism, to be intriguing but conflicted. Murray's aesthetics, structured by a neo-Aristotelian view of interactive drama and strongly influenced by the humanist subjectivity of the Victorian novel, aim at a creative maximization of narrative expression epitomized by a "half-hacker, half-bard" figure (9). Such an ideal figure tends to elusively conceal the significance of abstract games like Tetris, preferring at times to praise a more nostalgic, traditional liberal-humanist notion of

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[3] In a later essay, Murray reiterated this position, again including Tetris as an example: "Games are always stories, even abstract games such as checkers or Tetris, which are about winning or losing, casting the player as the opponent-battling or environment-battling hero" ("From Game-Story to Cyberdrama" 2).

storytelling that "helps us understand the world and what it means to be human" (26). Framing the "potential for compelling computer stories" on a progressive "road from puzzle gaming to an expressive narrative art" (53), Murray's progressive desire is to "move the established game industry far past the lucrative shoot-'em-ups and puzzle mazes" on the market today, imploring "more sophisticated developers" to "make stories that have more dramatic resonance and human import to them, stories that, . . . mean something" (54).

As a play of "irregularly shaped objects, . . . relentless activity, misfits and tight couplings, order and chaos, crowding and clearing," Tetris doesn't amount to much of significance for Murray: "while we experience the game as being about skill acquisition, we are drawn to it by the implicit expressive content of the dance" (144). The content of this "rain dance" is merely a primitive precursor to more authentic expression that Murray claims lies elsewhere, in a more fully-developed videogame medium: "The violence and simplistic story structure of computer skill games are therefore a good place to examine the possibilities for building upon the intrinsic symbolic content of gaming to make more expressive narrative forms" (144-5).

Murray's reading of Tetris drew strong criticism from a handful of formalist gamer-theorists who were just beginning to organize ludology as a scholarly field of game studies formed around an essentialist study of games "as games," set apart from the perceived colonizing attempts of other fields to "claim" computer games for their own (Aarseth, "Computer Game Studies, Year One"). In the years following Murray's interpretation, a handful of formalist responses worked to reclaim Tetris as a paradigmatic abstract game, an event horizon of the story-game divide representing the essence of what the field of ludology could claim as fundamentally a "game" and nothing else:

> A game like Myst has the quality of being representable in a traditional
> medium like the newspaper. . . . But they're usually the worst games. A game like
> Tetris, on the other hand, . . . looks dull in the paper, it has no story. And imagine

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a narrative as abstract as Tetris. This would be out of the question. Stories need human or anthropomorphic characters. Games don't. (Juul, "A Clash Between Game and Narrative")

[A] session of Tetris can hardly be recognized as narrative, mostly because of a lack of characters. However, some narratology authors claim that even a cooking recipe is narrative, so maybe a session of Tetris could be it, too. (Frasca)

Instead of studying the actual game [of Tetris] Murray tries to interpret its supposed content, or better yet, project her favourite content on it; consequently we don't learn anything of the features that make Tetris a game. The explanation for this interpretative violence seems to be equally horrid: the determination to find or forge a story at any cost, as games can't be games because if they were, they apparently couldn't be studied at all. (Eskelinen)

Games are games, a rich and extremely diverse family of practices, but fundamentally, they are games. . . . Games are not "textual," . . . games are not intertextual either; games are self-contained. . . . In Tetris, I do not stop to ponder what those bricks are really supposed to be made of. (Aarseth, "Genre Trouble" 47-8)

Murray offered her own critical summary of myopic formalism in the developing field, while acknowledging the adoption of Tetris as its paradigm: "The paradigmatic game for [ludology] is Tetris. According to the formalist view Tetris can only be understood as [an] abstract pattern of counters, rules, and player action, and the pattern means nothing beyond itself, and every game can be understood as if it were equally abstract" ("The Last Word").

My particular interest in this debate is in its emphasis on Tetris, and particularly the "meaning" of Tetris, as a recurring symbol of the conflict. While the game fundamentalists upheld Tetris as their paradigmatic game comprised of formal, rule-based qualities and little else, they left the significance of such a paradigm as largely self-evident based on the game's commercial success and the booming commercial videogame industry. I extend their analysis in this direction more explicitly, reframing the fundamental distinctions between game and narrative that

the ludologists were grappling with not as a pure, universal philosophical abstraction but rather as a novel commodity form reflecting certain general characteristics of our present capitalist age.

Amid the gallons of ink spilled over this ludological schism in the following decade, I find a productive middle-ground in Ian Bogost's attempt to bridge the divide of this "classic conflict between narration and simulation" (*Unit Operations* 99). His approach reframes the "meaning" of Tetris in terms of a more general cultural model:

> The problem with the Murray/Eskelinen approach to abstract puzzle games is that one wants the game to function only narratively, the other wants it to function only formally. Neither is exactly right without the other. The problem seems to be this: the "meaning" of an abstract puzzle game lies in a gap between its mechanics and its dynamics, rather than in one or the other. ("Puzzling the Sublime")

Bogost describes this "gap" between mechanics and dynamics as a "simulation", defined as "the gap between the rule-based representation of a source system and a user's subjectivity" (*Unit Operations* 107). According to this view, Murray's allegorical reading of Tetris is "entirely reasonable," as it "accounts for a biased, subjective response in the player," and "takes into account a larger system that the game represents in smaller part, the function of the unit-operational rules of the simulation, and a subjective response to the simulation that embeds an ideology" (101).[4] In this model it is a "larger system" of culture, a system at a higher level than the formal analysis of rules in isolation, that is the real product of the interpretation of "meaning" in the game object.

Nonetheless, despite being "reasonable," Murray's interpretation of Tetris as "a perfect enactment of the overtasked lives of Americans in the 1990s" is a generic reading that could equally apply to many sorts of cultural artifacts, and does not

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[4] See also Begy's "Interpreting Abstract Games," which evaluates and expands upon Bogost's simulation-gap analysis of Murray's Tetris reading through a terminology of "experiential metaphors" inspired by Lakoff and Johnson's work.

attend to any specific material qualities that mark Tetris as distinct from other forms of time-sensitive stress-inducing activity in human history. An interpretation of Tetris paradigmatically representing the videogame as a commodity form with unique material qualities requires both a closer mechanical and a broader social-historical reading of the videogame object's allegorical construction of digital space, which I will develop further in the following sections.

Digital gamespace

Like other videogames, Tetris allegorizes the computer's graphical display as a virtual space through an analogy to real, physical space. The experience of space produced by Tetris, however, is much different from experiences of physical space in other paradigmatic games such as Pong or Spacewar. The mechanisms of movement in Tetris are limited to discrete keyboard inputs rather than, for example, the continuous, analog potentiometer knobs used to control Pong paddles. The playing field of Tetris is comprised of a two-dimensional grid of 20 units by 10 units, much more limited in number than Spacewar's vast 1024 by 1024 coordinate landscape. To use a distinction that Deleuze and Guattari applied in their comparative reading of "The 'smooth' space of Go, as against the 'striated' space of chess" (353), Tetris allegorizes a contained, Cartesian gamespace that is distinctly "striated" as opposed to other "smooth" approximations of physical worlds.

The computer-graphical representation of striated space as a two-dimensional, cellular grid has its predecessor in von Neumann's two-dimensional models of cellular automata, which he used to theorize connections between McCulloch and Pitts's neural network model and Turing's one-dimensional paper-tape based universal computing machine, producing constructive simulations of self-reproducing automata. However, it was the promotion of more recreational models that brought this concept to the attention of the broader public, through Martin Gardner's popular

"Mathematical Games" column that ran in Scientific American from 1956 to 1986. A collection of combinatorial puzzles and other abstract, mathematical recreations, Gardner's column was responsible for introducing the notion of a striated gamespace to the public consciousness through its 1970 article, "The Fantastic Combinations of John Conway's New Solitaire Game 'Life'," as well as an ongoing popularization of "Pentominoes and Polyominoes" puzzles that served as the primary inspiration for Tetris.

In his 1965 book, *Polyominoes*, Solomon Golomb noted the particular significance of such puzzles to an increasingly combinatorially-dependent scientific landscape: "the ever-increasing importance of digital computers in modern technology has revived a widespread interest in combinatorial analysis, a subject that also has had important applications in such modern scientific fields as circuit design, coded communications, traffic control, crystallography, and probability theory" (44). The discrete, combinatorial spatial puzzles involving tetrominoes and other polyominoes indeed make it possible to engage in complex mathematical reasoning and problem-solving through analogies to the physical sensory experience of space, but the relation also works in the other direction as well: as with Conway's Game of Life, the same allegorical relation makes such spatial puzzles serve as the analogical, physical experience of our mental representation of digital gamespace, allowing us to experience the mathematical relations expressed through such games as an intuitive, emotional response.

Once the metaphor of tetrominoes as physical objects occupying combinatorial space is established, a whole set of additional material metaphors follows. The uniformly-sized tetromino objects and their all-or-nothing, occupation of grid-space resembles a dense, solid, manufactured material such as brick, and the involuntary, downward movement of the active piece evokes the pull of an algorithmic gravity on a solid object. The vivid space evokes within the player's imagination the feeling of

real, dense, space-occupying objects flung through the air, of the downward force of gravity, and of a pile of blocks accumulating at the bottom of a rigid well.[5] In his defense of the formal analysis of abstract games, Aarseth claims: "In Tetris, I do not stop to ponder what those bricks are really supposed to be made of" ("Genre Trouble" 48). However, such a claim reveals that even in such formalist analysis, a certain interpretation of the text must have already taken place: the discrete spatial units comprising the Tetris pieces as solid "bricks" already belies a chain of intertextual interaction metaphors extending the game's algorithm beyond a self-contained digital formalism into a human representation of physical, spatial experience. This combined set of interaction metaphors for manipulating solid shapes draws strong parallels to what Shneiderman famously described in 1982 as "direct manipulation" in relation to the now-ubiquitous desktop computing metaphor: "representation of the object of interest, rapid incremental reversible actions and physical action instead of complex syntax" (237). Direct manipulation is a perfectly appropriate description of the combined spatial and interaction metaphors used in Tetris.

Despite such physical metaphors of direct manipulation, I find some distinct differences between the digital space of Tetris and the intuitive experience of continuous, physical space. Even though the unit "bricks" and tetromino "pieces" are intuitively physical, we can only move the active block exactly one unit space to the right or to the left, not anywhere in between. In this way, I view Tetris as the ideal, abstract "allegorithm" of the computer game itself, relating sign to algorithmic function.[6] Tetris provides even the most uninitiated game player an intuitive,

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[5] Begy rightly speculates that "if Tetris were inverted such that the blocks rose from the bottom towards the top of the screen it would create a very different experiential gestalt" (84).

[6] Galloway and Wark have both advanced this concept of allegorithm in critical media theory: "To play the game means to play the code of the game. To win means to know the system. And thus to interpret a game means to interpret its algorithm (to discover its parallel 'allegorithm'). So today there is a twin transformation: from the modern cinema to the contemporary video game, but also from traditional allegory to what I am calling horizontal or 'control' allegory" (Galloway, *Gaming* 90-1); "Allegory is about the relation of sign to sign; allegorithm is about the relation of sign to number"

aesthetic, emotional access to the visual, digital logic of the computing machine from which it is produced. To play the game is to interpret and internalize its algorithm, not expressed as a mathematical formula or verbal narrative, but intuitively linked to basic human sensorimotor functions. The aesthetic function of Tetris thus familiarizes the mechanical, unfeeling, digital, virtual space of the computing machine through the basic spatial metaphors with which we are all already familiar.

I see its logic of digital space reflected back upon Tetris in an uncanny doubling effect: whereas the computer works to apply a grid of intelligibility onto the aspects of society its programs attempt to model, simulate, archive or control, Tetris applies a grid of intelligibility onto the machine itself—translating its opaque procedural mechanism and discrete logic into a form more directly discernible by human sensorimotor processing. Although the effect produces a sort of false consciousness (the player only controls the machine to the limited extent that it was designed to be played), it is precisely this illusion of agency in relation to an imagined computer that makes the simulation meaningful, even pleasurable, as Ted Friedman notes: "the pleasures of a simulation game come from inhabiting an unfamiliar, alien mental state: from learning to think like a computer" (136).

This psychological experience produced by the simulation game, of inhabiting an alien, algorithmic mental state, can be characterized as an emotion akin to the feeling of the sublime described in Kant's *Critique of Judgment*. In Kant's model, an experience of the sublime is produced when the mind's faculty of imagination is overwhelmed by its inability to comprehend the multiplicity of an object in a single intuition. Bogost offers a reflection on Tetris in comparison to two iPhone

(Wark par. 041); "The gamer discovers a relationship between appearances and algorithm in the game, which is a double of the relation between appearances and a putative algorithm in gamespace—that's allegorithm. But there is always a gap between the intuitively knowable algorithm of the game and the passing, uneven, unfair semblance of an algorithm in the everyday life of gamespace—this is the form that allegory now takes" (par. 031).

puzzle games along these lines, in a reading of the experience of abstract puzzle games through an application of Kant's mathematical sublime:

> One might find a similar mathematical sublimity at work in Tetris, after all. Each block alters the topology of the playfield, the player must alter that topology to continue the game, and chance dictates what pieces might be available to consummate the geometrical promises made earlier.
>
> But Drop7 and Orbital differ from Tetris in an important way: they are turn-based, not continuous. The player must always intervene to make the next move, offering an opportunity to reflect on the enormity of the task, a requirement of sublimity. . . . In Tetris, the method of play disrupts access to the sublime. ("Puzzling the Sublime")

While I find Bogost's connection between abstract puzzle games and the mathematical sublime illuminating, I fail to see why the temporal dynamic of Tetris "disrupts access to the sublime" found in other abstract turn-based games, as there is in fact no requirement that the subject pause to "reflect" on the task in Kant's model.[7] In the case of Tetris, such an experience of the sublime would be enhanced, not disrupted, by the temporal dynamics of its continuous loop of algorithmic interaction.

My reading of Tetris as pure simulation, studied in terms of its spatio-temporal operations alone and their cognitive effect on an idealized human player-subject, largely followed Bogost's unit-operational, simulation-gap model of game criticism. While I believe that such a reading adequately reconciles the interpretive schism surrounding Tetris within the game studies field, the meaning it produces still limits itself to an internal account of the particular spatial experience that uniquely defines the game as a self-contained system, rather than an external account of the game's historically-specific function within particular models of culture and

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[7] Within Kant's system, aesthetic judgments of the sublime are one category of "reflective judgment," which is perhaps misinterpreted here to imply meditative practice. Rather, Kant deploys this term in a specific sense, distinguished against "determinate judgment," to mean the construction of a universal concept from a particular.

society.[8] In particular, describing the relation between the videogame and its subject as one of reception and response to a "simulation" brackets off any traces of its outward commodity form, idealizing it as a perfect cultural transaction between a preconstituted game designer-producer and player-consumer. In the following sections, I will expand this limited, idealist model of a game's operation into a social-historical account of how Tetris in particular, and videogames in general, function as a commodity form within post-Fordist capitalism, an account that will also provide my reading with its political relevance.

Simulation as commodity

So far, my description of Tetris-space has remained within the confines of understanding the game as a simulation, and describing experience in terms of an allegorical relation to an idealized space of algorithmic computation. An attempt at discerning the meaning of Tetris as a canonical, paradigmatic videogame object merely in terms of its simulation of digital gamespace still refuses an adequate description of the relation of digital gamespace to the global system as a whole, and risks normatively reifying the broader social relations of the computer game complex which legitimate, define and protect the digital object as a given entity in our social world. As I extend my interpretation of Tetris into a social history, I intend to reconcile the allegorical function of the game's internal construction of space and time with its function as the complex, ubiquitous, legally-protected, billion-dollar brand burned into the psychological unconscious of its world of player-consumer subjects.

As I transition into social-historical analysis, I imagine the particular way in which a simulation relates to its broader world-system, with its varied political

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[8] As one example of a Tetris study limited to such a narrow form of analysis, Post's "Bridging the Ludology-Narratology Divide. The Tetris Case" offers an orthodox structuralist approach: "To bridge the divide between ludology and narratology, that is, to reconcile narrativity and interactivity, we need paradoxically where Barthes in 1966 called for, a 'structural analysis of narrative'" (36).

resonances, as a form of cognitive mapping. Friedman notes in his study of videogames as simulations, "Simulations may be the best opportunity to create what Fredric Jameson calls 'an aesthetic of cognitive mapping: a pedagogical political culture which seeks to endow the individual subject with some new heightened sense of its place in the global system'" (141). Jameson poses this same problematic in the context of "museum space," reading Hans Haacke's conceptual art as a project that expands into a politically-oriented cognitive mapping through a critique of its own institutional structure:

> [T]he work of Hans Haacke, for example, . . . redirects the deconstruction of perceptual categories specifically onto the framing institutions themselves. . . . [I]n Haacke it is not merely with museum space that we come to rest, but rather the museum itself, as an institution, opens up into its network of trustees, their affiliations with multinational corporations, and finally the global system of late capitalism proper, such that what used to be the limited and Kantian project of a restricted conceptual art expands into the very ambition of cognitive mapping itself. . . . [T]he spatializing tendencies, . . . become overt and inescapable in the uneasy gestalt alternation between a "work of art" that abolishes itself to disclose the museum structure which contains it and one that expands its authority to include not merely that institutional structure but the institutional totality in which it is itself subsumed. (158)

Jameson reads Haacke's work as a cognitive mapping in this political sense because of the self-referential attention to its own commodity status, which expands the observer's perception outward towards the institutional totality of global capitalism within which it is embedded. In a similar vein, I will follow the expansion of Tetris into the spaces of global commodified creativity characteristic of contemporary post-Fordist forms of digital entertainment. However, unlike Haacke's work which is designed to transparently disclose the "institutional totality in which it is itself subsumed," I see Tetris more like Andy Warhol's Campbell's soup cans, in that it does not autonomously function as a critical or political statement but rather it has the potential to function as a symptom of its environment through a critical reading.

A critical-historical, spectral reading of the commodity-space of Tetris, one that goes against the grain of the object to recover the repressed, smoothed-over controversies haunting its hard-fought security and legitimacy, can trace the contours of this symptomatic object, producing a cognitive mapping that could recover its political potential. It is with this aim that I begin my account of the history of Tetris in the next section.

2.2   Tetris as Cultural Commodity

Two Images of Tetris

To begin my social history of Tetris as a commodity form, I will first juxtapose two luminous injections of Tetris's cognitive mapping into the real space of everyday life to demonstrate the variety of expressions and distributions that are possible in order to emphasize the contingency of any particular approach.

First, a curious lamp made its debut at Toy Fair 2012 in New York, appearing in online retail outlets in time for the year's holiday shopping season ("New TETRIS® Themed Products"). The lamp is comprised of seven brightly-colored, detachable tetromino[9] shapes, each with a flat, fixed depth. When each piece is stacked on top of the base they light up, powered through electrical current sent through each piece's metallic edges. Anyone who has ever played Tetris on a computer, videogame console or mobile phone will immediately find the lamp's blocky, colorful visual design distinctly familiar, as the seven one-sided tetrominoes have secured a place in the optical unconscious of our global, computerized society.

What makes this lamp particularly notable is not merely its clever shape or functional design, but the logos and fanfare identifying it as an "Official Tetris™

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[9] Back-derived from Golomb's *polyomino*, *tetromino* is the mathematical term for the geometric shape comprised of four orthogonally-connected cells.

Product" ("Tetris™ Light"). The lamp was produced by Paladone, a UK-based gift supplier, as part of a partnership arranged by LicensingWorks!, a merchandise licensing company which represents The Tetris Company, the exclusive licensee of Tetris Holding, LLC, the corporate entity in charge of all intellectual property rights related to Tetris. Through this chain of sublicensing agreements, along with a similarly complex lineage of copyright and trademark assignments dating back to Russian computer engineer Alexey Pajitnov's original game design prototypes around 1985, an unbroken chain of public authorization extends to this official Tetris-brand lamp on display during the 2012 shopping season. This authorization carries with it an implicit injunction: without such a licensing arrangement to make authorized use of Tetris Holding's guarded intellectual property, it would be impossible to market a similar product in public for long before receiving a cease-and-desist letter from Tetris Holding with charges of trademark and trade dress infringement, and threats of long and costly litigation unless the product is removed and all copies destroyed immediately.

That same year, another Tetris-inspired work lit up the space of everyday life with a very different aesthetic. In a spectacular form of public Tetris craft, several successful installations of fully functional Tetris games on the face of tall buildings have been created using computer-controlled lights emanating from a grid of windows as unit squares of the game's display. The most recent implementation, installed on the face of MIT's Green Building in April 2012, has been called "The Holy Grail of hacks" by MIT students (Pourian 8–9). Aligning this aesthetic performance with a political position, the students who produced the hack subsequently published "MITris," their Java source code for "a game similar to Tetris using the windows of the MIT Green Building as pixels," under an open-source license on a public code hosting service, with their stated goal "to inspire the world at large to create interesting games, visualizations, or just about anything" (mitrisdev).

In stark contrast to the authorized marketing of Tetris-branded commercial products, a wealth of Tetris craft persists, despite the controlled spread of officially licensed merchandise. Due to its spatial simplicity and formal distinctiveness, Tetris-inspired visual expressions can be easily crafted from all sorts of different media, including chalk outlines, waffles, ice cubes, birthday cakes, nail polish, even marching bands, to name just a few. Indeed, to many, the production of public, unbranded Tetris craft represents the epitome of a hacker culture that embraces an open spirit of free play, averse (or at least indifferent) to proprietary, commercial products.

A similar Green Building Tetris hack was originally planned in 1995 by a group of MIT students including Vadim Gerasimov, who as a teenager worked with Pajitnov to co-author the very first published version of Tetris.[10] Although the first Tetris prototype was initially completed by Pajitnov sometime around mid-1985 on an Elektronika-60 computer,[11] Gerasimov rewrote the game for the IBM-PC platform himself within "a few days," according to his own recollection of events ("Tetris Story"). It was copies of this latter version that the team distributed for free on floppy diskettes to friends, leading to the game's popularity throughout Moscow and Eastern Europe on the path to its subsequent global fame. Gerasimov wrote that he "worked on Tetris just for fun" and received nothing in return, periodically distributing updates to the program over the next couple of years. Several years after Tetris was first released, Pajitnov reportedly "stopped by [Gerasimov's] home and asked [him] to urgently sign a paper 'to get lots of money for us from game companies.'" Since

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[10] Although Gerasimov's plans for a Green Building Tetris hack were not realized at the time, he built a playable software prototype in Java which he eventually published free of charge on his personal website ("Tetris on the Green Building").

[11] The date of Tetris's "creation" has undergone some interesting historical revision. Prior to 2009, The Tetris Company had always consistently promoted Tetris as "created in 1985 by Russian scientist Alexey Pajitnov" (Blue Planet Software). However, on June 2, 2009 (the first day of the annual Electronic Entertainment Expo), as part of a large and quite successful "25th anniversary" media campaign run by a PR firm, The Tetris Company announced for the first time that Tetris's "birthday" was now officially June 6, 1984 (Lewis).

then, Gerasimov's name "disappeared from all newly released versions of Tetris and all official documents" and has been stricken from official Tetris history. When a US copyright registration was eventually filed for the IBM-PC game Gerasimov himself wrote, Pajitnov was listed as the sole legal author.

In juxtaposing these two contemporary Tetris-inspired works, I suggest that the significance of Tetris in contemporary digital culture is represented in the space between these two images represented by Pajitnov and Gerasimov: between the corporate-sponsored "Official Tetris™ product" lamp endorsed by Pajitnov's Tetris Holding, and the Tetris Green Building hack first conceived by Gerasimov and finally realized in the public MITris performance and open-source code release. Generalizing this relation, we can say that the contemporary form of new media objects is held together by a tension: here, a tension between the Tetris game's abstract, formal simplicity and reproducibility, and the various intellectual property protections from which its legitimate heirs fashion a commercial game object and product brand.

More generally, this tension within the videogame object is distinctively spectral, in the sense that Derrida applies to this term in *Specters of Marx*. The videogame object is situated between enduring material elements, present in time and place that are accorded an author and provided legitimacy and protection, and spectral elements that circulate and propagate freely in a common, shared, public orality. Such spectral elements are never present in the object itself as perceived by the subject; rather, the object is haunted by their ghostly presence. What these specters represent, if they can be said to manifest anything as such, are the repressed histories and controversies of the property they haunt, of the ghostly alterity and play of ideas that speaks along the boundaries of a proprietary object that could have been or might yet become its other.

I will return to discuss Derrida's hauntology toward the end of this chapter (indeed, the theme of the specter haunts my entire analysis of the commodity form).

In the next section, I develop Walter Benjamin's concept of *aura* in relation to the habit-forming and image-persisting qualities of Tetris play, as a discourse that exceeds the ontological boundaries of the commodity form. As such, I read it as a preliminary or alternative hauntology.

Videogame's Aura

The structural conditions of Tetris's present-day commodity form bear some relation to, but also mark a significant transformation from, those conditions concerning Benjamin's analysis of the mass-produced work of art in the Fordist era. In this section, I read Benjamin's analysis of aura as a critical examination of that which exceeds the work of art's ontological construction of "presence" through physical property relations. Aura relates to the subject's unconscious perception and interiorization of the object as something not captured by the strictly economic analysis of exchange, yet can nonetheless produce a powerful effect. As his analysis of aura took place in an era when the economics of intellectual property were not yet codified into law and as thoroughly constitutive of global economic production as they are today, I believe the kinds of phenomenological tensions Benjamin identified in his concept are even more relevant to the ideal-type post-Fordist commodity form than that of his own era.

In his celebrated, enigmatic essay, "The Work of Art in the Age of Mechanical Reproduction," Benjamin laments the decline through mechanical reproduction techniques of a work's "aura," viewed as the "cult value of the work of art" (243n5), or a "unique phenomenon of a distance however close it may be" (222). Although an art object's material form may be perfectly copied through mechanical techniques, the unique presence of the original and its subsequent authenticity may not:

> Even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be.

This unique existence of the work of art determined the history to which it was subject throughout the time of its existence. This includes the changes which it may suffered in physical condition over the years as well as the various changes of ownership. . . . The presence of the original is the prerequisite to the concept of authenticity. (220)[12]

I interpret this analysis as a prototypical analysis of socio-economic distortions within the commodity form that would only later become fully institutionalized within the post-Fordist concept of intellectual property. In his age, visual media designed for mass reproduction such as film and photography were just beginning to establish a mass public, prompting drastic transformations within explosive new organizations of culture and politics. This new form of mechanically-reproduced media "detaches the object from the domain of tradition" (221), and "emancipates the work of art from its parasitical dependence on ritual, . . . the total function of art is reversed. Instead of being based on ritual, it begins to be based on another practice—politics" (224). This process of reversal produced the "growing proletarianization of modern man and the increasing formation of masses" (241), resulting in the dialectical crisis of Communism's politicization of art and repudiation of property relations opposed to Fascism's aestheticization of politics and upholding of property.

Within bourgeois cultural production more generally, Benjamin also noted that this process resulted in a shift in from "cult value" or "use value" to "exhibition value" or exchange value, a shift from the aesthetic appreciation of the work of art to the political economy of the mass-produced cultural commodity. In this analysis, the valuation of a uniquely-produced work of art, originally based in a ritualistic appreciation of the singular object, is displaced through industrial production into secular, economic terms as an exchange value normalized and regulated by a

[12] The footnote to this passage is also relevant: "Of course, the history of a work of art encompasses more than this. The history of the 'Mona Lisa,' for instance, encompasses the kind and number of its copies made in the 17th, 18th, and 19th centuries" (Benjamin 243n1).

strengthening juridical regime of property rights. In American film production, for example, this regime is capitalized upon by the monumental rise of the Hollywood studio conglomerates and the personality cult of celebrity. While for the traditional work of art "the quality of its presence is always depreciated" by mechanical reproduction degrading its authenticity (221), the quality of the cultural product designed for mass reproducibility, by contrast, is instead secured through the emerging legal regime of intellectual property rights necessary to secure its mass audience.

However, I find Benjamin's multivalent concept of aura to be not merely reducible to an economic analysis of prototypical intellectual property relations within the cultural commodity, as it also serves as a social critique of its ontology. As a medium of perception, aura exceeds the valuation of a cultural commodity within pure exchange, and it is this critical function that I wish to highlight in the concept. In his essay "On Some Motifs in Baudelaire", Benjamin remarks that "to perceive the aura of an object we look at means to invest it with the ability to look at us in return", citing Proust's notion of "memoire involontaire" alongside Valery's "characterization of perception in dreams as aural": "To say, 'here I see such and such an object' does not establish an equation between me and the object. . . . In dreams, however, there is an equation. The things I see, see me just as much as I see them" (188-9). Aura here gains the valence of an "optical unconscious," as a set of associations that distinctly bleed beyond the memoire volontaire that consciously perceives the object in its recognized form. In this sense, aura mediates an uncontrollable, unconscious desire that haunts the presence of the commodity-object.[13]

Relating Benjamin's perceptual metaphors to Tetris, I find a heightened significance in the auratic phenomenon known as the "Tetris effect" (Goldsmith). After intense play, players often report visions of falling tetromino-shaped blocks persisting in their dreams. In controlled experiments, even amnesiacs recall such

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[13] For more on how Benjamin's concept of aura shifts between multiple valences, see (Hansen).

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dreams and retain their Tetris-playing ability in subsequent plays, despite no conscious memory of their previous experiences (Stickgold et al.). In this quite literal sense, Tetris produces an aura through the interactive experience of play, an aura which inserts itself into the optical unconscious that orients future perceptions.

Benjamin compares, but distinguishes between, the aura of an object of perception from the "trace" of a utilitarian object: "If we designate as aura the associations which, at home in the *memoire involontaire*, tend to cluster around the object of a perception, then its analogue in the case of a utilitarian object is the experience which has left traces of the practiced hand" (186); and the emerging techniques of mechanical reproduction "represent important achievements of a society in which practice is in decline" (186). The medium of the videogame (for which Tetris is our paradigmatic example) can be characterized differently from the audiovisual work of passive perception, as a hybrid, utilitarian object of perception both observed and enacted. In contrast to the pure audiovisual work, reproduction of the videogame object encourages the formation of a "practiced hand," not merely its decline.

In sum, Benjamin's concept of aura evokes not only the alluring mystique of an inaccessible, authentic art object always removed from the commodity form in presence, but also an uncontrollable force that both invades the subject's optical unconscious and leaves traces of a practiced hand, depositing itself into memoire involontaire and haunting the object's presence as an element exceeding its commodity form.[14] As Pajitnov describes his creation, "Tetris is some song which you sing and sing inside yourself and can't stop" (qtd. in Goldsmith).

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[14] This dual function of aura relates to Huizinga's quasi-mystical account of the "magic circle" that not only bounds a game in distinct time and space but also imbues the play experience with meaning and significance, a play-function that bleeds beyond the game's boundaries to comprise a meaningful cultural component and civilizing function of society.

The distinctive character of Benjamin's aura is a simultaneous interiorization of the perceptual experience of a commodity, and commodification of interiority, features which have only grown importance in contemporary conditions of post-Fordism. Over the last half-century, a series of international trade agreements have expanded and standardized the notion of intellectual property from a loosely-connected set of industry-specific production arrangements to a unified, global regime of intellectual property protections. The 1980s was a crucial decade of this proliferation which saw the economic restructuring and eventual collapse of the Soviet Union, one of the largest remaining ideological barriers to the global capitalist expansion of property relations. This decade also saw the most dramatic expansion of property rights into the realm of the idea, prompted in large part by the formation of the computer software and videogame industry. Benjamin's critical analysis of aura therefore acts as a premonition of the forms of branding and intellectual property protection of mass-produced digital artifacts that define the post-Fordist commodity experience. In the next section, I relate how the specific business-legal history of Tetris was shaped by specific post-Fordist conditions of commodification including branding, licensing and litigation.

Branding Tetris

Pop-culture journalist David Sheff has documented the early history of Tetris in Game Over, where we read that the game was largely commodified through its eventual corporate integration and consolidation into an elaborate, and distinctly American, narrative of intellectual property license-oriented technological entrepreneurialism. Sometime around 1985–6, a director of the Computer Center where Pajitnov worked send a copy of the first published IBM-PC prototype of Tetris developed by Gerasimov to the director of SZKI, the Institute of Computer Science in Budapest. There, the game was "discovered" by the west in 1986, when the director of a UK

software company, Andromeda, saw the IBM-PC version running on a terminal during a visit to SZKI and, realizing the game's untapped commercial potential, began to negotiate licenses with Soviet government administrators in an attempt to commercialize the game in the West. From 1987 to 1989, a complex web of localized and platform-specific rights to the Tetris intellectual property were negotiated through Elorg (Elektronorgtechnica, the Soviet Ministry of Software and Hardware Export that centrally managed digital technology transfer for the Soviet Union), and tenaciously fought over by several computer game companies. This web of what Sheff called a "tangled family tree" (310) of licenses and sublicenses covered every computing platform from arcade machines to personal computers to Nintendo's Game Boy handheld console, in every developed geographical market from Japan to the United Kingdom to the United States.

This business-legal history largely determined the resulting structure of the game's commodification. Early on, the product's geographical focus moved from the Soviet Union to the United States, which provided the growing Tetris enterprise with a much more commercial-friendly legal protection and firmly established system of intellectual property protection than the Soviet regime could offer. June 2, 1989 was the "first use in commerce" date on Elorg's official US Patent and Trademark Office registration for the TETRIS mark, which marked the use of the Tetris brand as a key legal playing piece within an ongoing turf war between Nintendo and Atari Games in the American courts. On June 21, a U.S. District judge awarded Nintendo a preliminary injunction against its rival, resolving the trademark sublicensing dispute over two competing Tetris versions both released on the Nintendo Entertainment System earlier that year, which ordered several hundred thousand of Atari's game cartridges to be recalled from stores and destroyed.

Through the early 1990s, Tetris was canonized as one of the most popular successes of the videogame medium, thanks in large part to its licensing deals

with Nintendo that secured it a privileged spot within its proprietary computing platforms and videogame marketing channels that saturated the generation's digital entertainment. In the years since its initial conception, Tetris had evolved from a rudimentary prototype virally propagating through Moscow into an industry dominating, internationally-licensed property—a bundle of copyright, trademark and trade dress property claims, framed by growing consumer recognition and appeal bolstered by marketing budgets of companies such as Nintendo that stood to profit from commodifying the entertaining game in the form of licensed, packaged software for their entertainment systems.

The next phase of Tetris commodification began in 1995, when Pajitnov's ten-year licensing agreement with (post-Soviet privatized) Elorg expired, and Pajitnov teamed up with marketing-savvy business partner Henk Rogers to form The Tetris Company, a venture entirely dedicated to consolidating and exploiting the Tetris brand in future products. With a vision to become "the Coca-Cola of computer games" ("Mr. Tetris"), The Tetris Company set out to standardize the Tetris brand around a new iconic logo, a definitive design document (originally titled "What is Tetris?", subsequently called the "Tetris Guideline") standardizing details such as game mechanics and color styles for all subsequent Tetris-licensed products, and delivering legal threats and lawsuits to any games similar in name or design that encroached upon its share of the thriving casual puzzle-game market. In a 1999 magazine interview, Rogers explained the company's rationale behind its tenacious litigation tactics: "Intellectual property rights allow companies to invest real money in the development of new product. Look at any country where they don't have intellectual property rights. You don't find any interesting intellectual property being created there" ("Mr. Tetris").[15]

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[15] The interviewer goes on to note the irony: "Well, except for Tetris in the USSR" ("Mr. Tetris").

From 1995 to the present day, The Tetris Company has flexibly adapted its core property to every new consumer technology platform—from the early mobile phone platforms tightly regulated by telecommunications companies such as AT&T to the more competitive smartphone marketplaces administered by Google and Apple, from downloadable game software sold on Internet websites to always-connected Facebook games peddling virtual goods through in-game currencies. It engages in a precarious balancing act, paradigmatic of contemporary cultural commodities, of an open but authoritatively-controlled message: tacitly embracing and promoting emergent, Tetris-inspired crafts through public-engaged channels such as its corporate Facebook page, while simultaneously suppressing any Tetris-derived innovations successful or popular enough to compete in any of the brand's active markets. The resulting spatial distribution is an amateur, ephemeral, actively-forgotten culture alive with popular but ultimately unproductive activity around the edges of discourse, with an enduring, stable, branded, professional product at the center.

Haacke, the artist Jameson cited in his discussion of cognitive mapping, recognized the constitutive role of intellectual property in shaping cultural production and incorporated critical commentary on these issues in his creative work. Coombe mentions examples of the legal threats Haacke had received Mobil Oil and Philip Morris Co. regarding his work, "in one instance incorporating the threatening letters he received, together with an explanation of the legal defense of fair use, directly into his art" (74). It is with a similar aim of critical commentary on the transformation of the commodity form in contemporary life that I will next discuss how recent transformations in intellectual property law have shaped our understanding of the cybernetic commodity as object of property, and how the arguments put forth in a recent Tetris intellectual property lawsuit provides the most legible mapping of this commodity form.

2.3   The Idealization of Property in the Digital Age

Cybernetic Property

In his translation of Benjamin's media analysis of mechanical reproduction into "the age of cybernetic systems," Nichols describes a qualitative shift from physical, mechanical reproduction to logical, cybernetic simulation as the defining factor of the age:

> The chip replaces the copy. Just as the mechanical reproduction of copies revealed the power of industrial capitalism to reorganize and reassemble the world around us, rendering it as commodity art, the automated intelligence of chips reveals the power of postindustrial capitalism to simulate and replace the world around us, rendering not only its exterior realm but also its interior ones of consciousness, intelligence, thought and intersubjectivity as commodity experience. The chip is pure surface, pure simulation of thought. (33)

Nichols presents the critical question as that of control: "The ideal simulation would be a perfect replica, now controlled by whomever controls the algorithms of simulation. . . . Who designs and controls these greater systems and for what purpose becomes a question of central importance" (34–5).

The juridical-legal dimensions of property are a determining component of any "commodity experience" in contemporary cultural production. They are also its most opaque, socially-technically complex elements, where the boundaries of proprietary versus common conceptual elements are both widely misunderstood and feared by both producers and consumers, and are also undergoing rapid transformation and continuous public debate. An opaque, subjective doctrine of legal interpretation separates borrowing from copying, inspiration from appropriation, creation from clone. The struggle for creative control over commodity experience that takes place within this juridical-political sphere is "clearly a central area of conflict and one in which some of the basic changes in our conception of the human/computer,

reality/simulation metaphors get fought out" (38), and the legal reconceptualizations of copyright and patent law that enabled the commodification of algorithmic simulation to take place was merely "the process by which a dominant ideology seeks to preserve itself in the face of historical change" (38). The cell and the computer, linked through the cybernetic metaphor, were both officially commodified in 1980 through the extension of property rights to products of genetic engineering (*Diamond v. Chakrabarty*) and software engineering (in the Computer Software Copyright Act of 1980), intentionally promoting the development of protected products and services based on these new technologies.[16]

It is the juridical commodification of the videogame medium, however, that represents the normalization of cybernetic simulations as creative works of art. Nichols therefore looks to the precedent-setting 1982 copyright infringement case of *Atari v. North American Phillips*, where the working out of the legal doctrine in copyright law that distinguishes between unprotected general idea versus concrete, protected expression in comparing the video game Pac-Man against K.C. Munchkin "lends insight into the degree of difference between mechanical reproduction and cybernetic systems perceived by the United States judicial system" (41–2).[17] In its final analysis, the Seventh Circuit Court based its decision through analogy to an essentially visual notion of "aesthetic appeal":

> Video-games, unlike an artist's painting or even other audio visual works, appeal to an audience that is fairly undiscriminating insofar as their concern about more subtle differences in artistic expression. The main attraction of a game such as Pac-Man lies in the stimulation provided by the intensity of the competition. A person who is entranced by the play of the game, "would be disposed to overlook" many of the minor differences in detail and "regard their aesthetic appeal as the same." (qtd. in Nichols 42)

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[16] In 1983, an appellate court in *Apple v. Franklin* wrote: "We believe that the 1980 amendments reflect Congress' receptivity to new technology and its desire to encourage, through the copyright laws, continued imagination and creativity in computer programming" (1253–4).

[17] This case is also briefly discussed in Vaidhyanathan's *Copyrights and Copywrongs* (168–70).

The quotations in this judgment refer to *Peter Pan Fabrics v. Martin Weiner Corp.*, a 1960 copyright infringement case involving onamental designs printed upon cloth. In the *Pac-Man* case, however, the observer has become a player ("a person who is entranced by the play of the game"), and the visual aesthetic has become an experiential relation ("stimulation provided by the intensity of the competition"). As Nichols comments, this is a distinct transformation, marking a paradigmatic moment in the commodification of cybernetic systems: "The fetishization of the image as object of desire transforms into a fetishization of a process as object of desire. This throws as much emphasis on the mental state of the participant as on the exact visual qualities of the representation" (43).

The 1982 judgment on the *Pac-Man* case provided enough legal legitimation for the videogame industry's cultural output to be commodified in the form of copyrighted intellectual property. The basis and consequences of the transformation of consumer culture that largely shaped the practice of game design is, even thirty years later, still quite ambiguous and largely untested. If the creative expression of procedure was The ambiguity in the court system is partly explained by the extremely high legal costs required to follow any intellectual property dispute through to a final judgment, combined with the risk-averse business models of any company large enough to bear the costs.

Tetris v. Xio

In 2012, a lawsuit was concluded between Tetris Holding, LLC and Xio Interactive, Inc., in which the judge decided in favor of Tetris Holding on counts of copyright and trade dress infringement (*Tetris v. Xio*).[18] Xio was a small start-up business formed by two recent college graduates selling an iPhone variant of Tetris named *Mino* on Apple's App Store marketplace. Tetris Holding argued that Mino infringed the

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[18] For less critical law review articles summarizing this case, see (Lampros; Casillas).

copyright in its Tetris game by copying fourteen distinct, expressive elements, of which the following seven were all present in the original IBM-PC prototype:

1. Seven Tetrimino[19] playing pieces made up of four equally-sized square [sic] joined at their sides; . . .

3. The bright, distinct colors used for each of the Tetrimino pieces;

4. A tall, rectangular playfield (or matrix), 10 blocks wide and 20 blocks tall;

5. The appearance of Tetriminos moving from the top of the playfield to its bottom;

6. The way the Tetrimino pieces appear to move and rotate in the playfield;

7. The small display near the playfield that shows the next playing piece to appear in the playfield; . . .

11. When a horizontal line fills across the playfield with blocks, the line disappears, and the remaining pieces appear to consolidate downward.[20] (397–8)

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[19] "Tetrimino™" is a common-law trademark that The Tetris Company uses to refer to its tetromino-shaped playing pieces.

[20] Each of the remaining seven expressive elements first appeared in published versions of Tetris not copyrighted by The Tetris Company (as noted below), and would likely have been filtered from the comparison, had Xio known and included these historical details in its case:

2. The visual delineation of individual blocks that comprise each Tetrimino piece and the display of their borders [Tetris (PC), Spectrum Holobyte, 1987];

8. The particular starting orientation of the Tetriminos, both at the top of the screen and as shown in the "next piece" display [Tetris (ZX Spectrum), Andromeda, 1987];

9. The display of a "shadow" piece beneath the Tetriminos as they fall [Tetris: The Grand Master (Arcade), Arika, 1998];

10. The color change when the Tetriminos enter lock-down mode [Tetris (NES), Tengen, 1989];

12. The appearance of individual blocks automatically filling in the playfield from the bottom to the top when the game is over [Tetris (PC), Spectrum Holobyte, 1987];

13. The display of "garbage lines" with at least one missing block in random order [Tetris (Arcade), Tengen, 1988]; and

14. The screen layout in multiplayer versions with the player's matrix appearing most prominently on the screen and the opponents' matrixes appearing smaller than the player's matrix and to the side of the player's matrix [TetriNET (PC), 1997].

I will leave these elements aside for the remainder of my analysis.

Tetris Holding also argued that Mino infringed its trade dress consisting of "the brightly-colored Tetriminos, which are formed by four equally-sized, delineated blocks, and the long vertical rectangle playfield, which is higher than wide" (415).

Xio's central argument in its defense pointed to the long-standing doctrine that copyright does not protect rules, game mechanics and functional elements "is a basic tenet of intellectual property law" ("Xio" 6), as summarized in an factsheet titled "Copyright Registration of Games" circulated by the U.S. Copyright Office, which states:

> Copyright does not protect the idea for a game, its name or title, or the method or methods for playing it. Nor does copyright protect any idea, system, method, device, or trademark material involved in developing, merchandising, or playing a game. Once a game has been made public, nothing in the copyright law prevents others from developing another game based on similar principles. Copyright protects only the particular manner of an author's expression in literary, artistic, or musical form. (qtd. in "Xio" 6-7)

Xio argued that all of the "expressive elements" Tetris Holding accused it of infringing were actually "functional—either because they are a limitation and/or affordance of the game or because they otherwise play a functional role in the game" (42). Any requirement to modify or remove any of those elements would have prevented them from developing their own game based on similar principles following the conventional, familiar rules of Tetris. Changing these elements too much would effectively change the work into an altogether different, unfamiliar, or harder to play game. If Xio were to alter the dimensions of Mino's playfield or the shape of its playing pieces, for instance, it would result in much different gameplay, limiting its appeal to those players who were already familiar with the standard gameplay that Tetris had already established in its large player population. It would be as disrupting to conventional play as a computer chess game that was not allowed to display an 8x8 square, or the knight piece's L-shaped movement.

The counter-argument presented by Tetris Holding (and affirmed by the District Court judge) was that none of the elements should be considered functional rules at all, because a game could still be designed with the same "function" (that is, it could still "function perfectly well" as a game, an essentially useless, non-purposive object of entertainment) with an unlimited number of different gameplay design possibilities: "Tetris is an entertaining videogame, not a 'useful article' that must look a certain way. Tetris' expression serves no utilitarian purpose, and is not the 'rules' of the game" ("Reply Memorandum" 2).[21] The crux of this argument is the claim that, in the judge's own words, "Tetris Holding's design choices were essentially 'arbitrary flourishes' and were in no way related to the reason the game works or functions" (*Tetris v. Xio* 416).

Xio's legal defense was largely unprepared to counter this bold line of argumentation—no previously decided cases had ever questioned the premise that a particular game employs functional or utilitarian elements in the context of copyright or patent law. It was largely assumed, much to the chagrin of the relatively small board and card game industry throughout the 20th century, that the abstract game mechanics necessary for a game to be played were necessarily a part of its uncopyrightable system, as opposed to any ornamental decorations which would be appreciated and legally protected in terms of their respective linear media. However, in *Tetris v. Xio* the procedural system as a form of creative expression had become such a commonplace that the assumption that an "entertaining videogame" has no utilitarian "function" in the context of copyright law was accepted without hesitation.

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[21] Tetris Holding repeats this argument in several variations: "Tetris is a fanciful entertainment product that does not have to look the way it does" ("Reply Memorandum" 8); "Tetris is not a utilitarian product that has to perform a particular function—rather, it is a fanciful puzzle game created for entertainment and which could have had any myriad of designs" (11).

The Fun(ction) of Game Mechanics

Reading this initial controversy around the function of game mechanics more generally, I identify a tension upon which the constitution of the videogame commodity is founded: the game's extrinsic function in the commodity-space is in tension with the intrinsic aesthetic or entertainment value within its game-space. In an ideal model of the videogame as object of pure commercial leisure, one in line with the judge's assumptions in this case, the game-commodity has no practical function beyond providing fleeting entertainment. The object is transacted as a commodity on the open market, passively and happily consumed by the user without any lasting effect other than the empty experience of "fun," and the process would repeat itself with every subsequent play transaction. As pure recreation, the game object is completely emptied of any recognizable "function," and thus every aspect of its design would be protected by copyright as pure creative expression.

However, as suggested by the experience of aura as exceeding the commodity form discussed earlier, this fiction of the non-functional game object is never securely fashioned. Tension emerges between the fiction of Tetris as "just a game", as an entirely arbitrary design, with fanciful flourishes of expression that could have been equally produced otherwise with the same absence of effect, and the productive impulse to characterize the game as a recognizably useful device in its specific materiality. Within the cultural-scientific realm, Tetris is often characterized as something more significant and productive: it is touted for its educational value as a digital training apparatus and brain-booster (in scientific studies funded by the Tetris licensor),[22] and praised for its therapeutic value as a neuro-psychological relief

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[22] See (Haier et al., "Regional Glucose Metabolic Changes After Learning a Complex Visuospatial/Motor Task"; "MRI Assessment of Cortical Thickness and Functional Activity Changes in Adolescent Girls Following Three Months of Practice on a Visual-Spatial Task"). This latter study was funded by, and Haier was employed as a paid consultant for, Blue Planet Software, the company holding exclusive rights to Tetris.

for trauma flashbacks[23] and lazy-eye,[24] and even the mathematical formalization of its algorithm has drawn some scholarly interest.[25]

The legal narrative that Tetris Holding uses to protect its product integrates two orthogonal dimensions of intellectual property law, trademark/trade dress and copyright, that work together to form its object as a hybrid brand-product commodity. Although these two dimensions are comprised of distinct legal doctrines and thus require distinct methods of analysis, in this case both arguments similarly boil down to this tension between fun and function, or between arbitrary signifier/expression versus useful signified/content. First, the combination of the *Tetris* trademark and its trade dress consisting of "brightly-colored" tetromino pieces designate not only a distinctive source of a specific brand of game, but the generic, unprotectible name and behavior of the game itself. Second, the algorithm determining the shape, movement and behavior of the game pieces is not just an arbitrary, copyrightable audiovisual expression of an underlying system, but constitute the formal, unprotectible rules of the game-play itself. In order to secure legal property protection for Tetris as a commodity, the judge chose to indicate the first side of this tension and suppress the second.

Trademark and Trade Dress

The commercial identity of Tetris depends on signifying a paradoxical combination of both brand and product, denoting simultaneously the singular source and its generic object of entertainment. As codified in the Lanham Act in the United States and similarly enforced through international trade agreements throughout most of the first world, trademark law is primarily designed to protect only the words and marks

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[23] See (Holmes et al.).

[24] See (Li et al.).

[25] See (Demaine, Hohenberger, and Liben-Nowell).

that designate a specific brand, not a generic product. If trademark law granted a company exclusive control over a widely-used name for a product, this would unfairly restrict the ability of competitors to freely use the name to identify their objects in public.

Although the *Tetris v. Xio* case did not concern any rights over the word-mark TETRIS, the word still plays a crucial role in the struggle over the object it designates that warrants some analysis.[26] As a sequence of English letters, a proper name and a protected mark of trade, the origin of the word "Tetris" dates back to the creation and distribution of the similarly-titled game. Pajitnov formed the sign from a portmanteau of "tetra" and "tennis," compactly signifying two of the game's fundamental components: tetrominoes and kinetic recreation.

In accordance with the post-facto commodification of the game, the word originally appeared as the signifying name of a newly invented game, not the brand name of a commercial product. Spreading "like a wildfire" through Moscow and Eastern Europe (Sheff 301), the game of Tetris (as executable machine code), word of the game Tetris (as the interesting, original concept of a tetromino-stacking computer game), and the word *Tetris* (as a spoken and written word, program filename and intro screen title) all spread in conjunction. As hackers and hobbyists produced their own copies, ports, variations and translations of Tetris on other systems and devices, many adopted the name *Tetris* for their derived works, in order to maintain ties to the game rules that were being cited, adapted or remixed.

As already evident in these specters of freely-copied executable code and unofficial derivative works that mark the game's repressed prehistory, there is a disconnect between how the public generally understands a name like Tetris to refer to the abstract rules or play of a particular form of game regardless of its brand-name

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[26] The threat of Tetris Holding's trademark claims were still palpable in this case, as Xio's tetromino-stacking game was originally code-named "TetraNet" until they changed it to "Mino" in order to reduce its legal risk.

packaging, and how the trademark-function of the word *Tetris* ideally distinguishes a specific source or manufacturer of the game from any other versions of the game. The difficulty in distinguishing the Tetris brand from the game product through an unwieldy moniker such as "Tetris-brand tetromino-stacking computer puzzle game" demonstrates this disconnect.

Complicating this is the fact that The Tetris Company has actively policed public use of the word in its descriptive sense when affixed to unlicensed products. Software programs with "Tetris," "Tetri-," or even just "-tris" in their titles (including one iPhone game literally named "Tris") have been routinely sent cease and desist letters, and many have even been formally sued for trademark infringement, to the point that wary developers learn to avoid using any related word at all in their tetromino-stacking games for fear of litigious reproach (see DeMocker; Witherspoon).

The motivation for such policing comes from the legal doctrine of trademark dilution, which claims that a brand's property right requires its proprietor to prevent others from "diluting" the "goodwill" of the brand by associating it with inferior or unauthorized products. In theory, such a doctrine is intended to protect a brand's arbitrary sign from misuse; however, in practice, the doctrine tends to legitimize the displacement of the generic product identifier by a trademarked brand name in the consumers' consciousness, effectively monopolizing the market for the product. In the case of Tetris, since consumers know the game by no other name, it is impossible for them to find it other than by searching for The Tetris Company's policed trademark, effectively eliminating any competing products.

Coombe has noted that the doctrine of dilution gained increasing legal acceptance in the 1970s and 1980s along with the increasingly hegemonic commodification of consumer consciousness:

The trademark owner is invested with authorship and paternity; seen to invest "sweat of the brow" to "create" value in a mark, he is then legitimately able to "reap what he has sown." The imaginations of consumers become the field in which the owner sows his seed—a receptive and nurturing space for parturition—but consumers are not acknowledged as active and generative agents in the procreation of meaning. (71)

The protection of words firmly embedded in consumer's largely-unconscious habits of product identification, then, acts as a legally-sanctioned form of "mind control": "By controlling the sign, trademark holders are enabled to control its connotations and potentially curtail many forms of social commentary" (73).

Supported by enforcement of dilution claims, public perceptions of a trademark's authorizing significance often become a self-enforcing, self-fulfilling prophecy. As long as the public recognizes a difference between "official" Tetris-licensed games and unauthorized "clones" not named Tetris, while conflating the mark of authenticity with the mark of identification, public opinion is doubly leveraged to not just mis-recognize, but actively silence, unauthorized derivative productions through their lack of access to the only proper name that could address them. These illegitimate copies are always merely Tetris-*like*—not authorized to be Tetris®, and yet, only ever recognizable as its invisible Other.

Under the doctrine of dilution, there is a clear economic incentive to combining product and brand into a single sign, as it leverages the legal system to prevent competitors from being able to siphon away consumers with better versions of a similar product. However, the expanding legal doctrine of dilution is kept in check by the competing doctrine of genericness. This doctrine can cause a trademark to be officially released into the public domain, a fate that claimed such former brand names as *thermos*, *escalator*, and *aspirin*, once the public unequivocally recognized

them as product.[27] Likewise, the Tetris brand is perpetually haunted by the generic meaning of the game's name in the public consciousness, which threatens to release the name into the public domain at any moment. In order to protect and enforce the state-granted monopoly inherent in the property-function of its authorized name, Tetris Holding must assert a distinction between the distinguished significance of its brand name and the generic game algorithm to which it unmistakably refers. The name of the game, stripped of its logos, uniform colors and distinctive packaging down to the bare algorithm also known as nothing other than *Tetris*, thus threatens to dissolve the corporation's linguistic boundaries erected upon the same name.

Trade dress is related to trademark in that that it recognizes rights to control the usage of a sign associated with a brand, but trade dress protects a more general "look and feel" of a product rather than a word mark or logo. In Tetris v. Xio, Tetris Holding successfully argued that Mino infringed upon its trade dress rights in "the brightly-colored Tetriminos, which are formed by four equally-sized, delineated blocks, and the long vertical rectangle playfield, which is higher than wide" (*Tetris v. Xio* 415). Although the discussion of trade dress was less central to the case's judgment than that of copyright infringement and the arguments regarding the functionality of the game ran largely parallel in both discussions, it is important to note that through trade dress protections, Tetris Holding is able to doubly secure the protected status of its game as simultaneously brand and creative expression.

Copyright: Algorithm as object

The economy of granting monopoly protection to works of creative expression, as codified in copyright law, has historically developed through a liberal discourse which

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[27] This same fate loomed over the Monopoly brand in a trademark lawsuit where the game's name was judged to be generic in 1982. Parker Brothers managed a settlement in 1985, before the judgment to officially cancel its valuable trademark was formally concluded (Hollie; Orbanes 120–5).

takes such protection to be a natural right akin to property. Coombe, among many other voices in critical legal studies, has suggested that one of the strongest rhetorical forces driving the increasing protections afforded to intellectual property over the past century has been the Romantic individualist notion of the author as singular, creative genius, and the concept of property as a fundamental, inviolable right naturally granted to the autonomous, liberal subject: "The idea of an author's rights to control his expressive creations developed in a context that privileged a Lockean theory of the origin of property in labor in which the expressive creation is seen as an authorial 'work' that creates an 'Original' arising spontaneously from the vital root of 'Genius'" (219).[28] From these forces, one can imagine the fullest extent of a discourse formed by the metaphor of creativity as property: property rights would attach to an idea immediately and automatically upon conception, last perpetually, and no one is allowed to reproduce or reuse another's idea without permission, without exception. This metaphor treats the idea-object as a resource of limited quantity produced by a singular author through creative, material labor, such as a hand-crafted work of art, that provides the greatest benefit to society when the original owner is entitled to recoup his investment by fully exploiting the object's value through free and unlimited exchange on the global commodity marketplace.

This ideal of intellectual property as a natural right that would authorize a pure, authoritarian notion of proprietary discourse has always been kept in balance against the principle of freedom of expression. If the transmission or creative use of any idea whatsoever first required its original author's permission, the proprietors of thoughts or ideas that were so stock or commonplace that they had become a habitual or even necessary cultural component of any future creative or political expression would be granted a state-authorized power to arbitrarily censor or tax

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[28] Coombe also notes, "Critical legal scholars have written extensively about the inadequacies of Romantic individualism and its understanding of subjectivity, cultural agency, freedom of speech, and creativity" (212).

helpless individuals. Copyright law is therefore viewed as a balance struck between the benefit to society that occurs when ideas are freely usable by all, and the benefit that strong intellectual property rights provides to individuals as an incentive for future investment of creative labor and materials.

These productive tensions between proprietary idea and freedom of expression have become codified in digital copyright law through what are known as the idea-expression and abstraction-filtration-comparison doctrines, both of which were discussed in the *Tetris v. Xio* opinion. These doctrines both begin with the 1879 case *Baker v. Selden* as their inspiration, where the Supreme Court outlined a sharp distinction between copyrightable works of authorship and patentable "useful arts": "The description of the art in a book, though entitled to the benefit of copyright, lays no foundation for an exclusive claim to the art itself. The object of one is explanation; the object of the other is use. The former may be secured by copyright. The latter can only be secured, if it can be secured at all, by letters-patent" (105). This influential Opinion explicitly distinguished between works of functional and aesthetic works, limiting its discussion to the former while avoiding any judgment on the latter:

> Of course, these observations are not intended to apply to ornamental designs, or pictorial illustrations addressed to the taste. Of these it may be said, that their form is their essence and their object, the production of pleasure in their contemplation. This is their final end. They are as much the product of genius and the result of composition, as are the lines of the poet or the historian's periods. On the other hand, the teachings of science and the rules and methods of useful art have their final end in application and use. (103–4)

Thus, a suppressed ontological distinction between "fun" and "function" has deep roots in copyright law, one which is upheld in its application to digital intellectual property. The idea-expression doctrine derives from *Whelan v. Jaslow*, which condensed the analysis from *Baker* into a simple test: "the purpose or function of a utilitarian work would be the work's idea, and everything that is not necessary

to that purpose or function would be part of the expression of the idea" (1236). The abstraction-filtration-comparison doctrine comes from a 1992 court case, *Computer Associates v. Altai*, which criticized the Whelan test for relying "too heavily on metaphysical distinctions" and its "outdated appreciation of computer science" (706), proposing its own more pragmatic test designed specifically for the structure of computer programs. This test involves three steps: first, "break down the allegedly infringed program into its constituent structural parts"; next, "sift out all non-protectible material"; finally, "left with a kernel, or possible kernels, of creative expression, . . . compare this material with the structure of an allegedly infringing program" (706).

Despite such a seemingly rigid, programmatic doctrine for determining copyright infringement in computer programs, in practice, the process of sifting down to this "golden nugget" is exceedingly difficult and arbitrary. In particular, both of these doctrines followed *Baker*'s suspension of judgement on aesthetic works, and only dealt with computer programs that served a clearly-identifiable business function, an element which both opinions saw as essential to the proper application of their methods:

> The rule has its greatest force in the analysis of utilitarian or "functional" works, for the purpose of such works is easily stated and identified. By contrast, in cases involving works of literature or "non-functional" visual representations, defining the purpose of the work may be difficult. Since it may be impossible to discuss the purpose or function of a novel, poem, sculpture or painting, the rule may have little or no application to cases involving such works. (*Whelan v. Jaslow* 1238)

> The first step in this procedure is to identify a program's ultimate function or purpose. An example of such an ultimate purpose might be the creation and maintenance of a business ledger. (*Computer Associates v. Altai* 697)

For *Tetris v. Xio*, the question of the appropriate application of these doctrines was definitively posed: which elements of a copyrighted videogame comprise its unprotected, functional ideas, and which are its protected, aesthetic expression?

The two opponents offered conflicting interpretations. Xio argued, citing Juul's theory of games as a hybrid of game rules and game fiction, that a game's unprotected ideas could be demarcated by a formal analysis of the "limitations and affordances" produced by the game rules. If a game element specifies a limitation or affordance that comprises a substantial component of the play experience, then it should be considered an unprotected idea. If a game element is primarily decorative, narrative or thematic in nature, only marginally affecting the algorithmic "core" of a play experience, it could be considered a protected expression. This interpretation stems from ludology's essentialist separation of game elements from story elements discussed in the first section of this chapter. It holds that as a paradigmatic abstract game, the basic rules of Tetris contain no verbal story elements, and therefore nothing essential to its operation constitutes protected creative expression.

Tetris Holding, however, disputed this ludological mapping of game rules/fiction to the legal concepts of idea/expression. Serving as an expert witness in support of The Tetris Company, Bogost argued in favor of a broad, vague determination of the idea and rules of Tetris:

> The idea of Tetris is that of a game with blocks on the screen, which are assembled into specific shapes and manipulated by the player. The rules of Tetris are that an object appears on the playing field and the player manipulates the object to a final resting spot, to create a shape, which is then removed from the playing field. ("Declaration" 5–6)

As Xio argued in response, Bogost's rules are so vague that they are completely divorced from any conceivable understanding of the rules of Tetris, and "would apply to games that look nothing like Tetris, like Connect Four, and arguably even checkers and chess" ("Xio" 31). In his court testimony, Bogost explained that the

"rules" he specified do not necessarily contradict Juul's definition of game rules, but are merely on a "higher level of abstraction" from them: "There are many ways of understanding rules. In fact, many have illusions of different understandings of rules. To me, [Juul's] definition of rules sits at a level lower than my understanding of rules. This is a discussion of the way rules might be interpreted rather than rules themselves" ("Deposition of Dr. Ian Bogost" 172.17–19).

No argument was offered as an explanation of why other game elements were absent from this account of the rules of Tetris, or upon what analytical basis this "higher level of abstraction" is more appropriate than Juul's. The playing field dimensions and the specific movements of playing pieces, for example, are among the most standardized and regulated components of the rules of chess and checkers, as they are in most board games. Why should those elements remain absent from the rules of Tetris, other than as a *post hoc* self-legitimation of the designer's protected, creative expression?

This methodical silence is repeated in the judge's opinion, who conceded that there was little on which to ground any such distinction: "While the unenviable task of dissecting a game's ideas from its expression is difficult, I am guided by case law and common sense, and find that the ideas underlying Tetris can be delineated by understanding the game at an abstract level and the concepts that drive the game" (*Tetris v. Xio* 408). While refusing "to articulate a rigid, specific definition" of game rules, the judge nonetheless offered an account of the "general, abstract ideas" of Tetris:

> Tetris is a puzzle game where a user manipulates pieces composed of square blocks, each made into a different geometric shape, that fall from the top of the game board to the bottom where the pieces accumulate. The user is given a new piece after the current one reaches the bottom of the available game space. While a piece is falling, the user rotates it in order to fit it in with the accumulated pieces. The object of the puzzle is to fill all spaces along a horizontal line. If that is accomplished, the line is erased, points are earned, and more of the game board is

available for play. But if the pieces accumulate and reach the top of the screen, then the game is over. These then are the general, abstract ideas underlying Tetris and cannot be protected by copyright nor can expressive elements that are inseparable from them. (409)

While slightly more specific than Bogost's definition of the rules of Tetris, the conspicuous absence of a 10-by-20 playing field and one-sided tetrominoes from this description of the ideas underlying Tetris was enough to render a judgment of copyright infringement. In my analysis, I claim that this conspicuous absence is only made possible by the latent distinction between fun and function underlying copyright law since *Baker* that has allowed creations "addressed to the taste" and designed only for the "production of pleasure" to be excluded from limitations against copyright protection applied to other explicitly purposeful, functional works.

The integrated cultural commodity

In summary, the *Tetris v. Xio* case serves as one of the most illuminating documents on the present state of the juridical commodification of the videogame medium. Tetris appears here not only as a canonical, paradigmatic abstract game, but as an integrated formation of trademark, trade dress, and copyright protections that have each expanded to accommodate the novel commodity forms being produced by the contemporary game industry. The result of these new concessions within the case-law doctrine of intellectual property is the transformative commodification of game-playing itself, from a socially-oriented, community-forming activity into an integrated, legally-protected, proprietary commodity. Prior to the game industry's aggressive expansion of the game into a commodity form, the concept of a game was as an oral, dialogic activity, with rules continuously and freely negotiated among players even if written down.

Within the field of game studies, Bogost recognized the unique relation videogame production maintains with intellectual property law, and suggested that effective game criticism must become cognizant of this function:

> Unlike psychoanalysis or literary theory, IP [intellectual property] is a stable relationship regulated by governments and markets instead of critics. The rules of IP are flexible and may change, but its fundamental principle is legal, not literary. . . . Intellectual property relations can be modified and interpreted by law, and effective criticism of games as cultural works may need to take the licensing operation into account in understanding how a work functions discursively. If there was ever any doubt about the political economy of works of art, game engines end that doubt. (*Unit Operations* 61-2)

While I agree with Bogost that the transformation of intellectual property law and licensing relations as discussed above are a crucial component of "effective criticism of games as cultural works," this still begs the question: effective for whom? Bogost's own political-economic game criticism of Tetris amounted to a reinscription of the figure of the Romantic author of individual genius and unbounded creativity in the form of the contemporary game designer. His expert report successfully advocated a broad expansion of our contemporary system of intellectual property rights into even the most abstract form of procedural expression, which was certainly effective for The Tetris Company's continued proprietorship over its lucrative game and brand. In contrast, my own criticism of Tetris developed through this chapter speaks not on behalf of the powerful, valuable game-brands already dominating our social landscape, but instead in behalf of a broader public interest in the ubiquitous cultural commodities through which meanings and identities are constructed, an interest which is being continually eroded and exploited through the ongoing commodification of play, of which Tetris is one of the most powerful representatives.

The intrinsic and extrinsic interpretations of Tetris-space exhibit an intriguing allegorical symmetry, both representing a process that encloses a continuous, fluid, smooth space into a discrete, bounded, striated system. The intrinsic allegory relates

the embodied manipulation of physical objects to the digital manipulation of a computational simulation; the extrinsic allegory relates the shared imagination and evolving languages, games and symbols of mass culture to the intellectual property regime's violent boundary construction and regulation of a proliferation of fixed cultural commodities designed for functionless consumption.

I will conclude by sketching out two thematic avenues for productive public engagement in full view of our particular cartography of the commodity form. First, there is the prospect of gradual cultural-institutional reform within the normative legal discourse itself, following the work within the field of critical legal studies that supplements a critique of the autonomous liberal subject with a progressive call for recognizing limitations to individual property rights with a recognition of public cultural interests. Second, there is the possibility of ethically and politically motivated cultural work to preserve and promote popular social histories of games, more readily emphasizing public contributions, engagements, and controversies that would otherwise have been suppressed by the workings of ludocapitalism.

2.4   Conclusions

Play as Everyday Practice

One of the great ironies of the emergence of globally-commodified video games as the paradigmatic play form is that the conspicuous accumulation of constraints and restrictions on free-play with its cultural artifacts is a direct result of the increasing expansion of its commodity form. Through the expansion of legal arguments such as those that found in *Tetris v. Xio* that present the videogame as a non-functional entertainment commodity, the subject of popular videogame culture is interpellated into a *gamer*, a politically-impotent, fun-seeking, consuming recipient of legally and technologically guarded, untouchable game-objects, where any creative potential

latent in the consumer-gamer's unique or individual experience, any room for the everyday practice of play, is reduced.

Having articulated the legal hegemony underlying the videogame as commodity form, I will next outline some potentially productive directions for institutional resistance and reform that I find particularly applicable. First, I find Michel de Certeau's concept of everyday practice to be an inspirational model of active resistance from within consumer culture. In his study of how the everyday practices of "users" and "consumers" of popular culture operate, de Certeau recognized and encouraged the processes through which "everyday life invents itself by poaching in countless ways on the property of others" (xii). Taking issue with Alvin Toffler's enthusiasm for the nomadic "self mobility" of a "'new species' of humanity," de Certeau lamented that under the conditions of commodified consumption, "instead of an increasing nomadism, we thus find a 'reduction' and a confinement: consumption, organized by this expansionist grid takes on the appearance of something done by sheep progressively immobilized, . . . such an image of consumers is unacceptable" (165–6). This passive image misunderstands the act of "consumption" as "'becoming similar to' what one absorbs, and not 'making something similar' to what one is, making it one's own, appropriating or reappropriating it" (166). This emancipatory figure of the reader is one characterized by "advances and retreats, tactics and games played with the text, . . . playful, protesting, fugitive" (175).

Next, I find Henry Jenkins's interpretation of de Certeau's figure of the playful reader as "textual poacher" in the context of television fan culture to be a particularly applicable form of populist resistance to cases of commodified cultural hegemony similar to Tetris. In *Textual Poachers*, Jenkins argues that fandom can create its own "particular forms of cultural production, aesthetic traditions and practices" that "appropriate raw materials from the commercial culture but use them as the basis for

the creation of a contemporary folk culture" (279). The legitimacy that Jenkins strives to offer unofficial fandom gestures tentatively to a basis for a populist challenge to the copyright regime: "The nature of fan creation challenges the media industry's claims to hold copyrights on popular narratives. Once television characters enter into a broader circulation, intrude into our living rooms, pervade the fabric of our society, they belong to their audience and not simply to the artists who originated them" (279). This argument dovetails with my above discussion of aura for its focus on the subject's involuntary associations with the object: to the extent that any authored object is interiorized by the consumer and integrated into public forms of cultural expression, property rights of the original author should cease. Such a celebration of fan culture is, if not a sustainable argument for the legal reform of copyright laws, at least a legitimate recognition and moral defense of an alternative model of audience-oriented, participatory ownership of cultural symbols under conditions of mass communication.

For more specific suggestions on intellectual property policy reform, I find Julie Cohen's proposals in *Configuring the Networked Self* to be well-balanced and particularly applicable to the dialectics of play underlying the paradigmatic commodity form of the videogame discussed in this chapter and the cultural conditions of ludocapitalism more generally. Cohen draws a connection between the cultural and economic configurations that modern intellectual property law is designed to construct and the potentially transformative power of the play of everyday practice, articulating the two in an incremental blueprint for information policy reform. She calls for replacing the autonomous, rational liberal human subject with the play of everyday practice as "the means by which human beings flourish" (56), an ambiguous but crucial component of creative practice that is becoming lost in our legal transition toward the totalization of intellectual property protection of cultural objects:

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> In the ongoing dialectic between ad hoc, reactive tactics and situated creativity, the most salient aspect is not one or the other, but the continual interplay between them. Play's ambiguous status—shaped by cultural constraints, but not wholly dictated by them—is the source of its potentially transformative power. (55)

Culminating in a set of concrete proposals for progressive intellectual property reform, Cohen argues in favor of reevaluating the balance of interests underlying intellectual property in a manner that doesn't automatically endorse the neoliberal tendency to enclose the entire space of cultural activity within a rationalized grid of property rights, systematically privileging and perpetuating an industrialized cultural hegemony. Instead, she advocates implementing a "cultural environmentalism" that can identify value in the play of everyday practice, providing an analytical "breathing room" that would preserve "interstitial complexity" within the analytical spaces that identify distinct creative and innovative works as protectible commodities (248). In other words: "the system of copyright requires the deliberate introduction and maintenance of legal and institutional discontinuities that shelter cultural play" (240).

With respect to games, such a greater cultivation of spaces and forms of semantic discontinuity would give long-deserved recognition to emergent practices and cultures of game play as a welcome supplement to the liberal author-figure of game design. Although such play practices have always existed, they have been made invisible from the object-perspective of autonomous authorship embodied in intellectual property law. In the case of Tetris, the few months of part-time work that Pajitnov reportedly invested into the original Tetris prototype is dwarfed by the collective engagement of hundreds of millions of players over the past quarter century and their collective material involvement in shaping the norms and rules of the game into what it is today, and this disparity should not be discounted or ignored when it comes to granting the right to enjoin follow-on creative work.

Although commodified-public spaces such as those cultivated by Creative Commons and the GNU General Public License[29] provide legitimate alternative paradigms of creative coordination that confront and liberate the privatization of digital culture and infrastructure, it is also the case that "copyleft" models tend to implicitly sanction rather than resist the further legal commodification of culture, leading in the end to a greater acceptance of and affinity with the modern intellectual property regime that leaves the surface of culture without those porous, flexible spaces of "breathing room" that Cohen demands for the play of everyday practice. Even if the creation of a commons-friendly game-design practice where works would be encouraged to be published with blanket open-content licenses permitting free reuse of any intellectual property were to emerge, it would do little to challenge the hegemony of proprietary commodities embedded in popular cultural consciousness. Although tactical maneuvers to create such intellectual sanctuaries within the confines of the existing intellectual property regime are nonetheless welcome and encouraged, I believe that the cultivation of sustained, productive discourse on the ethical balance of property rights in the conditions of popular culture is equally important.

Toward a Hauntology of Tetris

Careful attention to everyday practices of play thus reveals that the most powerful, threatening, potentially transformative specter within a hauntology of Tetris is the specter of play itself. In the conditions of post-Fordist commodification of videogame objects, The subject's freedom to play with the game is erased, leaving the mere

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[29] Coincidentally, the name "GNU" is itself an unauthorized tactical citation of a widely-adopted proprietary system: "It turns out that classic FOSS 'hacker wordplay' names like 'GNU' are actually an excellent way to avoid possible trademark infringement claims. Since 'GNU' itself does not resemble the word 'Unix' at all, and since when expanded it explicitly tells the reader that the product is **not** Unix (i.e., 'Gnu's Not Unix'), a potential trademark holder on the term 'Unix' would be hard pressed to make the case that consumers would be confused and think that GNU really is Unix" (Fontana et al. 5.8n2).

ability to consume the game exactly as produced. However, the creative, potentially transformative power of the play of everyday practice beckons through the subject's own assimilation of the game to their own social-technical identity. The playing subject desires not only to play again and again in repetition as proper consumption, but to play differently, to tinker with, extend and explore the structure of the game itself, to produce something recognizably different—a port to a new digital platform, an extra feature, a slight tweak or customization, a set of "house rules" that signify local tastes or customs. The tensions that produce Tetris as a protected object of property also produce the haunting of an unfulfilled play-desire.

I have suggested throughout this chapter that Tetris, as paradigm of the ideal-type videogame commodity, is haunted by elements of culture and society that remain on the periphery of dominant liberal-humanist ideals of authorship and property. From Gerasimov's suppressed contributions of free labor on the original Tetris prototypes, to folk Tetris crafts reappropriated as viral brand marketing, to proprietary claims over basic spatial movements lodged deep within players' dreams and consciousness of algorithmic gamespace, this history of Tetris provokes tensions and co-dependencies between the market-enabling conditions of property ownership and the communicative conditions of free play.

As a contribution to the discourse of intellectual property, I encourage an ongoing critical account of "spectral" elements of culture within the intellectual properties that comprise our contemporary lives to draw our attention to the memory of those silenced, devalued, replaced or excluded from cultural speech within the technoliberal marketplaces that constitute our digital environments. In *Specters of Marx*, Derrida presents a deconstruction of Marx's figure of the specter within the Communist Manifesto and other works as a substantial critique of ontology as presence, and an exploration of its formative boundaries through provocatively manifesting the non-presence of its other:

Altogether other. Staging for the end of history. Let us call it a *hauntology*. This logic of haunting would not be merely larger and more powerful than an ontology or a thinking of Being. . . . It would harbor within itself, but like circumscribed places or particular effects, eschatology and teleology themselves. It would comprehend them, but incomprehensibly. (10)

Applying this "logic of haunting" to the meaning, history, and properties of Tetris discussed in the chapter, I construct a political orientation from the margins of the ontological form of the videogame commodity itself. Through the ghostly figures that Derrida found in Marx's Communist Manifesto a call for the "spectre of communism" haunting Europe to be manifested into a living reality of proletarian revolution: "the essence of the political will always have the inessential figure, the very anessence of a ghost" (127). To form such an ethical-political relation to new media objects, we can be attentive to marginal figures and fantasies that haunt the hallowed grounds of authoritative properties, and bring to consciousness those marks and works of desire, alterity and play that have been and will be silenced by the overwhelming presence of the proprietary object and juridical-political tactics deployed to maintain its legitimacy and singularity.

It is through this figure of the specter that I find a voice in the silenced expressions of popular imaginations of Tetris in the forms of ports, hacks, clones, derivations and homages. Beyond functioning as an allegorical simulation of digital space, I have focused my case study of Tetris on its particular construction as a commodified, legally-protected property composed of brand and software, resting on an ideology of "fun" as expression of creative genius entitled to expansive legal protection that is uniquely pervasive in our era of post-Fordist ludocapitalism. I have linked proposals for intellectual property reform to a revaluation of the videogame commodity that recognizes cultural activity haunting the property's juridical-political contours, speaking against the monologic, idealized voice of the designer-author-proprietor through the actively forgotten, silenced, illegitimate,

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polyphonous voices of hackers, bootleggers, entrepreneurs, pirates, developers, hobbyists, and players who all perform their own "work" on, with and through the object in focus and on display.

In 2007, a panel of game academics and industry veterans chaired by Henry Lowood voted to include Tetris in their proposal for a "Digital Game Canon" of the "10 most important video games of all time" (Chaplin). The goal of the canon, modeled after the work of the National Film Preservation Board, was "an assertion that digital games have a cultural significance and a historical significance," and "a way of saying, this is the stuff we have to protect first." While not opposed to such a model of preservation and archival, the aim of a game criticism modeled instead on a logic of haunting is for the public politicization of such neutral archival discourse, transforming its mission from consensus-oriented preservation of the most successful or influential creations into an active work of mourning, ontologizing and identifying the remains of those buried cultural works not creative enough to survive the business-legal logic of ludocapital. Such work of mourning counters the narrative of the singular, original author of culture representative of "the amnesiac order of capitalist bourgeoisie (the one that lives, like an animal, on the forgetting of ghosts) . . ." (Derrida, *Specters of Marx* 139). This hauntological response to the ontological question gestures beyond the liberal humanist lineage of property, authorship and commodity formation to resurrect unexpected, surprising material from the unmarked void of technoculture, actively transforming rather than passively preserving the meaning of the canonical object on display. Instead of a cultural memory that merely perpetuates the Lockean ideal of "preservation of property," the alternative, hauntological form of historical work with which I have followed Tetris in this chapter reconstructs the object as symptomatic of its environment, presents a cognitive mapping of its particular regime of capitalist accumulation and makes analysis and criticism of this broader social formation possible.

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I have studied in this chapter, through the example of Tetris, how the digital game object has undergone transformation into a commodified, legally-protected integration of authored product and marketed brand, a transformation paradigmatic of post-Fordist ludocapitalism and of the videogame industry that has been both driving force and benefactor of these changes. Beyond the legal consolidation and protection of creative properties as discussed in this chapter, another aspect of industrial videogame and software production that maintains cultural hegemony is the expanding technical gap between producers and consumers maintained by the high cost, restricted access, and other social-economic difficulties in acquiring the technical literacies necessary for producing creative work within new media platforms. I therefore shift in the next chapter toward a more concrete, material layer of digital game and software development, to a critical analysis of the computing technologies and programming languages that ground digital media in the industrial practices of software engineering. Here, I track how the liberal-humanist concept of literacy has transformed into the technocultural concept of procedural literacy, and I contrast the complex, expert-oriented technical codes and protocols underlying our vast communications networks with calls for a renewed digital public sphere accountable to a notion of civil society grounded in the languages of everyday life.

Chapter 3

Procedural Literacy: Toward a Programming Public

[Writing programs] had to do with using them to be a mirror of your thought process, to actually learn how to think. . . . I think everybody in this country should learn how to program a computer, should learn a computer language, because it teaches you how to think. It's like going to law school, . . . it teaches you how to think in a certain way. . . . I view computer science as a liberal art. It should be something that everybody learns. (Jobs, The Lost Interview*)*

Introduction

In this chapter, I develop the concept of procedural literacy as a pedagogical facet of the ludocapitalist subject. As a key topic in public education policy debates and a rhetorical source of public funding for emerging, large-scale mass code literacy campaigns and technology-education reform movements, procedural literacy embodies an idealization of education most appropriate to ludocapitalism. Combining low-level operational knowledge of complex technological systems with a strategic, participative understanding of dynamic social environments, the concept of procedure is as equally applicable to "rules of the game" as to the

functional composition of software artifacts. As a broad platform of technocultural pedagogy, procedural literacy thus purports to capture something essential about how ludocapitalism operates through social-technical procedures increasingly mediated by computing machines.

Though I support the basic progressive tenets of procedural literacy, I believe that its discourse so far has been mostly celebratory and largely lacking in critical analysis. My novel contribution to this discussion is to situate the concept within a more nuanced political-ethical context from which a critical perspective can be made possible. To accomplish this, in this chapter I supplement the contemporary technocultural emphasis on computer code with an orthogonal concept of procedure within legal theory, from a perspective which understands modern administrative systems of legal codes through the normative, idealizing assumptions of democratic principles derived from Enlightenment philosophy. Though my research in this direction is speculative, I believe that linking procedural literacy to a richer democratic context and raising questions about the legitimacy of knowledge on offer to the public is crucial if the contemporary deployment of mass procedural literacy is to become socially transformative and resist acting as a passive form of technical indoctrination in service of existing technocratic power.

My discussion within this chapter proceeds as follows:

First, I introduce contemporary discourses of procedural literacy within industry and academia, starting with Codecademy's industry-supported campaign for mass programming education, followed by academic discussions of procedural literacy by Murray, Mateas, and Bogost within the digital humanities field. While these two forms of procedural literacy advocacy are each at the forefront of articulating, validating and disseminating new forms of procedural knowledge embodied in software and videogame artifacts to broad publics, they both share the limitations of a dispassionate approach toward procedural knowledge that accepts the technical

content of such forms of procedural literacy as they are given. In response, I draw a distinction between such mastery and a more nuanced critical literacy (drawing upon Turkle's distinction between "hard" and "soft" mastery), and argue that theories of procedural literacy require a stronger articulation of the latter through greater recognition of the links between the public adoption of specific bodies of linguistic-technical knowledge and the education ideals of democratic society.

Next, I elaborate the theoretical basis of a social-political understanding of procedural literacy by interrogating the link between rhetorics of literacy and the Habermasian ideal of a bourgeois public sphere. Noting that this link has been more developed for the legal concept of "procedure" than for computer code, I develop a critical theory of procedural literacy by relating Habermas's theory of the public sphere within a proceduralist paradigm of law to the computing context.

Third, following this theoretical discussion I develop a practice-oriented critique of programming language systems that considers specific computing languages in terms of the legitimacy of their notational systems to be informed by and held accountable to a broad public sphere. I analyze and compare two alternative literacy-oriented programming language frameworks, DrScheme and Processing, focusing my observations on the contributions and limitations each framework offers toward a broad procedural literacy.

Finally, I conclude by summarizing the practical insights derived from these programming framework critiques into generative tactics for critical procedural literacy practice.

3.1   Procedural Literacy

In this section, I examine the concept of procedural literacy as it has developed in contemporary technoculture as a particular perspective on modern computer

programming education. I understand this term as the intersection of procedure, a concept with roots in modern bureaucratic and judicial administration describing the mechanization or routinization of illocutionary (or "effective") action, with literacy, a socio-political condition produced by the production and dissemination of a standardized forms of knowledge, technologies, and educational institutions for a mass public.

The notion of procedure has a history within legal formalism predating that of the electronic computer. Weber understood the concept of procedure as the link between the rationalization of modern administrative machinery and the formalization of legal procedure:

> Juridical formalism enables the legal system to operate like a technically rational machine. Thus it guarantees to individuals and groups within the system a relative maximum of freedom, and greatly increases for them the possibility of predicting the legal consequences of their actions. Procedure becomes a specific type of pacified contest, bound to fixed and inviolable "rules of the game." (*Economy and Society* 811)

Weber's use of a game-playing metaphor to illustrate this point about juridical formalism indicates that game rules had been recognized as a paradigmatic competitive procedural context well before the advent of economic game theory.

Likewise, the concept of the computing machine condensed and formalized the notion of procedure, established through a metaphorical comparison to the routine, bureaucratic performance of following such "rules of the game." Turing famously formalized the concept of the "computing machine" as the mechanical idealization of a well-disciplined human agent manipulating arbitrary symbols with a pencil and paper: "We may compare a man in the process of computing a real number to a machine" ("On Computable Numbers" 231). In fact, Turing even explicitly invoked the bureaucratic concept of "rules of procedure" in a later description of his famous comparison: "It is possible to produce the effect of a computing machine by writing

down a set of rules of procedure and asking a man to carry them out. . . . A man provided with paper, pencil, and rubber, and subject to strict discipline, is in effect a universal machine" ("Intelligent Machinery" 416).

In recent years this mechanized concept of procedure, at the foundation of computing culture and other rationalist systems theories, has become a key term in debates over the expanding role of computer technology in liberal arts education. An increasing number of voices from both the tech industry and the digital humanities argue that the computerization of society has elevated procedural knowledge into a mass literacy, one that demands new approaches to computing education (and innovative educational technology) in order to best serve future generations of students. I will examine representative voices from industry and academia in turn.

Code Year

In January 2012, an unusual New Year's resolution topped the lists of many tech-savvy bloggers, social media users, and other aspirational members of the digital periphery: learn to "code." This peculiar resolution was evangelized by Codecademy, a two-man startup company just four months old in its social media marketing campaign for "Code Year," a free e-mail subscription to weekly JavaScript web-programming tutorials delivered through an interactive web application designed for anyone, with no prior programming knowledge or experience required (Wortham). Backed by the prestigious and well-connected startup incubator Y Combinator, Code Year struck a cultural nerve and became a media phenomenon: Within a month, over 350 thousand people had subscribed to the campaign, most notably following an enthusiastic Twitter announcement of support from New York City billionaire mayor Michael Bloomberg. The startup secured over $12 million in private venture capital funding from a group of international investors before the company's first anniversary, with hopes of growing their online tutorials into a global, profitable operation.

Codecademy represents a common, widely-criticized model of technical education as a commercial, global commodity, promising an efficient, guided drilling of programming syntax and grammar with little regard to context or application, branding itself as an easy, accessible, no-cost path to Internet enlightenment. The broad, vocal support for Code Year reflects the long-accepted insight that new digital literacies are facilitated by renewing cycles of information and communication technologies (ICTs), a quite commonplace position in public policy and education discourse in recent decades.[1] The open, pragmatic question of how best to integrate computer technology into literacy has produced volumes of research on themes such as "technological," "digital," "new media," and countless other forms of literacy.[2] Such far-reaching institutional debates concerning the use of computing technology in education provide a broad literacy context for a more narrowly-focused claim advanced by mass programming education ventures such as Codecademy, which I will focus on in this chapter: computer programming itself is becoming increasingly legitimated as a more fundamental form of literacy to be placed alongside print, visual, and other multi-modal literacies. The claim resulting from this strong form of code literacy is that everyone, not only computer scientists or software industry professionals, can and should learn to code, not merely for vocational purposes but to "actually learn how to think," as Apple founder Steve Jobs famously described the fundamental purpose of programming in a 1995 interview (*The Lost Interview*).

Beyond the insular world of tech startups and venture capital, rallies for mass programming literacy such as Code Year have ignited a lingering debate in the academic field of digital humanities regarding the social and pedagogical value

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[1] One notable example is the 2008 report of the Knight Commission on the Information Needs of Communities in a Democracy, which offered a recommendation to "Integrate digital and media literacy as critical elements of education at all levels through collaboration among federal, state, and local education officials" (45).

[2] See for example (Dakers; Jones and Flannigan).

of cultivating programming skills outside software engineering professions.[3] Although many code-savvy digital humanists and technologists agree that some amount of fluency in the vast, rapidly-evolving array of technical languages and computing jargons developed within the software industry is increasingly essential for contemporary knowledge work, there is an acute tension within the humanities between linguistic-technical mastery and broader social-cultural context. It is within this tension that the concept of procedural literacy has developed, expanding to encompass not merely the technological environments of computing machines but also other rule-based procedural systems that circumscribe contemporary society, including legal codes, economic markets, games and simulations.

Procedural Literacy

Within the contemporary academic field of digital humanities, the principal property of the computer as embodying the essence of bureaucratic "procedure" was rediscovered in 1997 by Murray, who argued that "the procedural power of the computer" lay in "its defining ability to execute a series of rules" (*Hamlet on the Holodeck* 71), and looked forward to future forms of "procedural authorship" and "procedural virtuosity" that would better suit the new medium. Michael Mateas, drawing upon experience teaching undergraduate new media courses to non-computer science majors, built upon Murray's concept in 2005 to define "procedural literacy" broadly as "the ability to read and write processes, to engage procedural representation and aesthetics, to understand the interplay between the culturally-embedded practice of human meaning-making and technically-mediated processes" (101–2). With this somewhat circular definition, Mateas took pains to avoid any hasty reduction of the concept to any easily-instrumentalized programming

[3] For an overview of academic responses to Codecademy, see (Widner, Ghajar, and Jacobs); see also (Williamson) for a more critical overview.

skill: although "the craft skill of programming is a fundamental component of procedural literacy, it is not the details of any particular programming language that matters, but rather the more general tropes and structures that cut across all languages" (102). As a result, this academic concept of procedural literacy has gone beyond competing tech industry efforts to distance itself from a purely vocational or instrumental notion of technocultural knowledge.

I read Mateas's and Murray's standard models of procedural literacy as the contemporary revival of an education concept with a history almost as long as that of the electronic computer itself. To illustrate this lineage, I will next compare this standard contemporary model against historical versions of procedural literacy offered in the early 1960s and again in the early 1980s. Following this discussion, I will consider Bogost's variation on this procedural literacy model that attempts to address issues with its ahistoricity and universality.

History of Procedural Literacy

As early as 1960, forward-thinking academics in the earliest computer-equipped universities have been calling for an increased presence of computer programming activity in liberal arts education. In a 1960 lecture series in celebration of MIT's centennial on the theme "Management and the Computer of the Future," computer scientist Alan Perlis delivered a talk on "The Computer in the University" where he outlined his vision of the computer's critical role in modern education, urging its inclusion in an undergraduate curriculum:

> [T]he product of a university education should receive training directed to the development of sensitivity, rationality, and an intelligent table look-up procedure.
> Sensitivity, . . . is a feeling for the meaning and relevance of facts. Rationality is fluency in the definition, manipulation, and communication of convenient structures, experience and ability in choosing representations for the study of models, and self-assurance in the ability to work with the large systems that are unfortunately necessary for modeling and solving the important problems of our

times. Table look-up, of course, refers to the mechanism for gaining access to a catalog of facts and problems that give meaning and physical reference to each man's concept of, and role in, society. While the computer may conceivably play a small role in the development of human sensitivity[4], it is quite critical to the other two developments. . . .

[T]he first student contact with the computer should be at the earliest time possible: in the student's freshman year. . . . [E]ach student during this first course should program and run or have run for him a large number of problems on the computer. At least in engineering and science programs, this course should share with mathematics and English the responsibility for developing an operation literacy, while physics and chemistry develop the background toward which this literacy is applied. In a liberal arts program the course could be delayed until the sophomore year, but certainly deserves inclusion in such a program because of the universal relevance of computers to our time. (187–8)

In this talk, delivered at a time when less than a hundred electronic computers existed in the world, Perlis raised the nascent discipline of computer science to the same level of broad public significance as mathematics or literature, advocating a shared responsibility for developing an "operation literacy" he saw as crucial for the "fluency" or "rationality" required to work with the "large systems" tasked with "modeling and solving the important problems of our times." Perlis's call for code literacy was marked by an enthusiastic acceptance of the overwhelming complexity underlying modern society's machinery, a computational rationality both "unfortunately necessary" and with "universal relevance" in the postwar cybernetic era.

This vision met with general approval from its audience, comprised of many influential figures in the emerging academic-military-industrial computing complex. However, two important, contrasting visions were also presented in the ensuing discussion, which I believe represent important critical responses to Perlis's increasingly popular advocacy for "operation literacy." First, Peter Elias commented

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[4] In response to a comment from J. C. R. Licklider, Perlis later removes his reservation on this point, agreeing that the computer can play a critical role in developing sensitivity as well (204).

with an alternative vision of a much more restricted role for computer programming education in future generations:

> I have a feeling that if over the next ten years we train a third of our undergraduates at M.I.T. in programming, this will generate enough worthwhile languages for us to be able to stop, and that succeeding undergraduates will face the console with such a natural keyboard and such a natural language that there will be very little left, if anything, to the teaching of programming. (qtd. in Perlis 203)

While Elias's feeling that the challenge of constructing programming languages as expressive as natural language would be completed within a decade was ultimately shortsighted, the general idealism in his statement remains an open, provocative question: Does the technical gap between programming languages and "natural" languages used in everyday forms of communication represent the emergence of a fundamentally new paradigm of knowledge at the heart of human rationality, or is it instead a temporary technical limitation, one that can be delegated to a specialized technical discipline and reduced or eliminated with greater research and development efforts into machine-language design? If the latter, then designing programming languages to be easier to use, and to be integrated as closely as possible with its audiences' existing "natural" language development, could be even more beneficial to the development of procedural literacy than a focus on training or teaching methods alone.

Second, the historian of science C.P. Snow (most famous for his "Two Cultures" lecture) delivered a lecture in the same series that related an ongoing concern about an emerging technocratic order surrounding computing machines, envisioning a scenario where "a handful of people, having no relation to the will of the society, having no communication with the rest of society will be taking decisions in secret which are going to affect our lives in the deepest sense" (9). In contrast to Perlis's embracing the complexity of monolithic computing machines and the need

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to train students to operate them (the exorbitant cost and exclusive access giving this literacy theme an elite, exclusive character) as an inevitability of the modern age, Snow was concerned by the tendency of such complex systems to consolidate power in the hands of an elite few, leaving those without privileged access to the relevant decision-making context subject to the interests of those in power, and vulnerable to systematic exploitation and structural inequality.

Snow's concern, acutely felt amidst the wealth of secretive, expensive, expert-oriented government-funded defense and operations research taking place at the time, illuminated a key issue at stake in procedural literacy: technical languages, conceptual models, and even methods of posing problems and forming solutions produced within restricted environments have a tendency to reproduce their designers' enclosed ideologies. When such a technical code starts to expand into a mass literacy, while beneficial to industries or individuals ahead of the curve and equipped with the relevant expertise, it also subjects this expanded public to a structural dependency upon the codified knowledge and institutions responsible for its standardization and governance. Sometimes this subjection is explicit, as is the case for proprietary programming languages or operating systems where the adoption and use of such technologies remains commercialized and dictated by the constraints of intellectual property licensing agreements. However, as Bryson and de Castell argue, it is precisely when technological paradigms begin to take root in educational contexts as "implicit, embedded stories" to the exclusion of other possibilities and prospective uses that "educational technologies can become *technologies of normalization*" (217).

Indeed, a common theme of such technologies of normalization is the refrain that the form of knowledge language on offer is not merely educational for the particular affordances it might offer the learner, but that it provides a universal, abstract, rational competency. Perlis articulates this dialectic of programming as deriving a universal literacy from a particular practice: "The point is not to teach

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the students how to use Algol, or how to program the 704. These are of little direct value. The point is to make the students construct complex processes out of simple ones (and this is always present in programming), in the hope that the basic concepts and abilities will rub off. A properly designed programming course will develop these abilities better than any other course" (Perlis 206). Mateas, in his own account of Perlis's lecture, reads this argument approvingly: "Here Perlis makes it clear that programming is a medium, in fact *the medium* peculiarly suited for describing processes, and as such, a fundamental component of cultural literacy, and a fundamental skill required of new media practitioners and theorists" (7).

The concept of procedural literacy as a neutral, universal signifier of "basic concepts and abilities," of programming as "*the medium* peculiarly suited for describing processes" is an image that links the mainframe machines of the 1960s as the subject of Perlis's literacy to the ubiquitous, networked mass computing environments of the 2000s that concerned contemporary digital humanists such as Mateas. Spanning these two generations, Seymour Papert's decades-long affiliation with the Logo project is perhaps the most influential and popular technology education project in the half-century history of universal procedural literacy discourse. Logo originally began as an NSF-funded research project to develop techniques for teaching children formal mathematical concepts using computers, starting in the mid-1960s at the technology firm Bolt, Beranek and Newman, with several core researchers including Papert continuing development at MIT through the 1970s.[5] In the early 1980s, as personal computers were just beginning to enter schools and households, Papert's widely popular book *Mindstorms* sparked an educational movement around Logo, which had assumed a broader significance as "the name of a philosophy of education in a growing family of computer languages that goes with it" (217). In this book, Papert explicitly linked the computing machine to the universal

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[5] For a good summary of Logo's early project history, see (Chakraborty, Graebner, and Stocky).

rationality of abstract human thought: "The computer is the Proteus of machines. Its essence is its universality, its power to simulate" (viii); "My interest is in universal issues of how people think and how they learn to think" (10). His work is also an early source of an intentional ambiguity in the word "procedure," simultaneously referring to the restricted concept of procedure used within computer science (a program subroutine or a named sequence of machine-executable commands) and the generalized concept of a rule-based social activity. He describes the latter as a "people procedure," presenting one example where he constructs a pseudo-Logo code sequence of fine-motor actions that a human juggler might invoke to execute the people procedure "TO JUGGLE" (107). Starting from the Logo-language computer-based microworld and expanding outward into the real world in this way, Papert argues that the computer is a uniquely appropriate place for children to develop the universal quality of "procedural thinking," faintly echoing Weber's own game-playing metaphor:

> Why don't children learn a procedural approach from daily life? Everyone works
> with procedures in everyday life. Playing a game or giving directions to a lost
> motorist are exercises in procedural thinking. But in everyday life procedures are
> lived and used, they are not necessarily reflected on. In the LOGO environment,
> a procedure becomes a thing that is named, manipulated, and recognized as the
> children come to acquire the idea of procedure. (154)

Despite Papert's stated intention that his focus is "not on the machine but on the mind," and that he sees the computer as a mere "carrier of cultural 'germs' or 'seeds' whose intellectual products will not need technological support once they take root in an actively growing mind" (9), his argument for a universal procedural literacy rested on the assumption that the concrete "idea of procedure" as advanced by the Logo environment unproblematically corresponds with an abstract, universal mode of "procedural thinking" that operates invariantly throughout culture and history.

In response to such historical claims to the universality of computing and of procedural literacy that mirror contemporary ones, I find it helpful to recall that despite claims to be teaching broader concepts, each generation of procedural literacy was bounded by historical and material constraints regarding the specific content and intended goals of such computer-programming instruction. For example, Perlis's call to code in the 1960s addressed a sizable, though still relatively marginal, specialized labor force in service of substantially government-funded military and academic research interests. As Nathan Ensmenger recounts in his social history of computer programming, as computer applications began to enter the private sector a "software crisis" was identified in 1968, provoking several conflicting visions of the development of programming labor into a standardized commercial industry. The debates surrounding this crisis eventually consolidated on the professional-association model of "software engineering" comprised of skilled, high-tech workers more familiar to us today.

In contrast to both periods, contemporary calls to code reach beyond an elite few with privileged access to restricted and expensive university, military or corporate hardware installations, and even beyond a professional class of software engineers. Rather, they address a mass, middle-class, global public, one that views the acquisition of high-tech skills as a form of upward mobility, linked through the distributed communication spaces of the Internet with many orders of magnitude more powerful, portable and affordable computing resources at its disposal. With less expensive, mass-produced personal computer hardware reducing barriers of cost and access to within reach of a middle class consumers, programming has now become "something any high school student can do with a decent paperback on the subject and a couple of weeks of effort" (Rushkoff 143), suggesting that it can be delivered as mass education and productized into an educational commodity as in the Codecademy model.

Expanding Procedurality

Keeping in mind this insight that computing has a concrete history that should not be abstracted into an ahistorical model of procedural literacy as a universal "fundamental skill," I next turn to Bogost's critical expansion of the concept of procedural literacy into a theory with greater cultural resonance. In *Persuasive Games*, Bogost supports and extends the concepts of procedural authorship and procedural literacy developed by Murray and Mateas, offering his own take on procedural literacy that emphasizes the craft-oriented construction of code. Like Papert, Bogost explicitly generalizes procedural literacy not just beyond any particular programming language but also beyond the computer itself:

> [P]rocedural literacy entails the ability to reconfigure concepts and rules to understand and [sic] processes, not just on the computer, but in general. . . . Procedural literacy should not be limited to the abstract ability to understand procedural representations of cultural values. Rather, it should use such an understanding to interrogate, critique, and use specific representations of specific real or imagined processes. (245–6)

> Procedural literacy entails the ability to read and write procedural rhetorics—to craft and understand arguments mounted through unit operations represented in code. The type of "reading" and "writing" that form procedural rhetorics asks the following questions: What are the rules of the system? What is the significance of these rules (over other rules)? What claims about the world do these rules make? How do I respond to those claims? (258)

In addition, Bogost suggests that procedural literacy is a kind of learning that is fundamental to, or is at least privileged in, contemporary videogames, inviting comparisons to James Paul Gee's influential work on links between videogames and literacy and learning:

> [T]he learning that takes place in videogames is not just comprised of abstract processes, following the constructivist tradition, nor their surface content, following the behaviorist tradition. Rather, videogames use abstract processes to make procedural claims about specific topics. (245)

Videogame players develop procedural literacy through interacting with the abstract models of specific real or imagined processes presented in the games they play. Videogames teach biased perspectives about how things work. And the way they teach such perspectives is through procedural rhetorics, which players "read" through direct engagement and criticism. (260)

Bogost's position displays a balanced pragmatism and a careful consideration of the previous theories of literacy upon which it builds, and as such it provides a good point of departure from which to situate my own critical contributions to the concept throughout the rest of this chapter. Its central insight is a critique of Papert's constructivist tradition for its focus on "abstract processes" as the ultimate end of procedural literacy, as opposed to any situated or domain-specific knowledge: "It is precisely specific areas of experience that have been expunged from our understanding of constructivist learning and procedural literacy in particular" (250). Bogost illustrates his argument by way of comparison to neoclassical approaches to the use of Latin as a cornerstone of literacy, from which he cites an influential text arguing that "Latin trains the mind to think in an orderly fashion. Latin, . . . is the mental equivalent of a daily two-mile jog" (Wise and Bauer, qtd. in *Persuasive Games* 248). In response, Bogost argues that the specific material and historical context of particular domains of knowledge negate the possibility of an abstract, universal literacy, because such learning is intricately tied to its context. Comparing neoclassical and procedural approaches to literacy, Bogost writes:

Latin, [the programming language] C, and other language systems share basic properties. . . . [They] thus enforce a procedural rhetoric in each of their created artifacts. . . . But the cultural, historical, and material contexts for Latin and C are far from similar. Mastering the syntax and grammar of one over the other both opens up and closes down whole worlds of future knowledge and expression (249)

Bogost's critiques both code-literacy rhetoric that focuses too strongly on acquiring programming skill, and the constructivist tradition's model of a universal procedural

literacy. His argument for a for a procedural literacy that "reconciles subject-specificity and abstraction" (244) is an important corrective that makes the concept more suitable for the humanities.

I base my departure from Bogost's position upon two central criticisms. First, I worry that this concept of procedural literacy becomes too generalized as a result of its middle-ground approach, to the point that it is offered as an abstract tool of rhetorical analysis arbitrarily discoverable in any system whatsoever without any means of evaluation. In one example, Bogost cites Playmobil toys as an example of procedural literacy qualitatively different from the kind he finds in Lego-construction play because the "high specificity" built into the Playmobil sets with themes such as metermaids and chimney sweeps "offers procedural learning on a much more deeply culturally embedded level than Lego" (256).[6] In another example, he identifies the basic act of commodity consumption (as observed in the videogame Animal Crossing) as a "procedural rhetoric of debt and consumption": "Learning how to smartly amass and expend capital is a type of literacy that haunts many adults" (268).[7] By expanding the concept of procedure to encompass his particular variant of social systems theory, Bogost thus risks sweeping the totality of cultural activity, from highly specific forms of practice demanded of professional game designers, politicians and tax attorneys to more mundane forms of consumer purchasing and children's make-believe toys, into a precariously flat ontology under a universal heading of "procedure" encompassing the entirety of modern life.

Second, although Bogost takes pains to apply procedural literacy broadly to "processes, not just on the computer, but in general," its concrete application to videogames and software-engineering domains as object-oriented programming

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[6] See also ("Learning From Playmobil").

[7] An earlier published draft of the same essay makes this claim more explicit: "the process of amassing capital and then choosing how to expend it is a kind of procedural literacy that continues to haunt many adults" ("Procedural Literacy" 36).

dominate the discussion at the expense of marginalizing other historical or alternative forms of bureaucratic procedure. This marginalization mirrors Papert's earlier subordination of "people procedures" to the computer-procedural perspective of Logo subroutines.

This combination of advocacy for such a relativistic notion of literacy with a self-conscious focus on market-dominant popular cultural genres and technological platforms risks implicitly naturalizing dominant forms of media technology that surround us, and is exacerbated by a rhetorical move that universalizes the concrete literacy in question to represent, in theory at least, any "system" whatsoever. This is a non-politics of separate-but-equal ontological egalitarianism that Bogost articulates in his later philosophical work: "All things equally exist, yet they do not exist equally" ("Materialisms").[8]

In this view, all forms of play and procedure may "equally exist" as potential literacies but, much like contemporary "standard English" in its hegemonic relation to minor languages and dialects, popular, dominant, or "effective" literacies are viewed as more in touch with centralized flows of power in society and therefore become the default, prototypical instantiations worthy of sustained attention to the exclusion of others in educational environments.

On the one hand, such a pluralist embracing a totality of social, cultural and technical configurations into a concept of "procedure" productively resists both a technocratic reduction of the world into an overdetermined process dictated by the constraints of the machine as in programming-skill oriented education efforts, and also a conservative notion of literacy focused exclusively on print-based forms of communication. At face value, such a generalized concept of procedural literacy (here, I would also include the parallel concept of "multiple literacies" underlying Gee's own link between video games and literacy) particularly attentive to the

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[8] See also Bryant's exegesis of Bogost's thesis in *The Democracy of Objects* (279–90).

technical complexities introduced by modern computer systems is a hard position to contest—after all, who can object to more, as opposed to less, familiarity and facility with the technical codes, processes and systems increasingly underpinning computerized society?

On the other hand, although the generalized procedural literacy concept developed by Murray, Mateas and Bogost has been rhetorically useful in breaking down lingering prejudices against unconventional or non-traditional literacies, I find it lacking any prescriptive or normative substance. There are many conflicting opinions regarding the desired degree and specific content of procedural competency publics at large should ideally be responsible for, particularly if such considerations are extended beyond individual preferences (such as Lego vs Playmobil play) to matters of public policy and political choices, prioritization of public education funding among competing literacy programs and interests, and so on. Should we build our complex computing infrastructure around the responsibility of a select few engineers and technical experts as Elias advocated, or should we exhort a broader mass society to learn general-purpose coding skills in order to cultivate a more code-literate public? If the latter, which programming languages or systems should we teach such publics, and on what basis should we select or develop suitable pedagogical material?

These are complex questions that a neutral, sociological embrace of all forms of procedural or technological literacy is not equipped to adjudicate, as the stakes and interests of designers, marketers, owners of and investors in the specific computing technologies on offer are too central to dispassionately ignore. In a critical survey of national funding of technological literacy programs in the United States, Cynthia Selfe notes that "on a pragmatic level, definitions of literacy serve as triggers, or requirements, for other socially determined systems of support," and "play a significant role in creating and maintaining a cohesive hegemonic system in the United States that affects every citizen's chances of success" (18). Such rhetorics of

digital literacy thus serve a normalizing function, legitimizing particular programming languages and environments, development and design paradigms over others by leveraging power and influence from educational institutions adopting their message. One classic example of such a hegemonic effect in Apple Computer's educational initiatives in the early 1980s, where the company's early dominance of the burgeoning personal computer market can be at least partially attributed to its strategic partnership with Papert's Logo Computer Systems, Inc. (LCSI), including a successful bid to donate one Apple II computer (bundled with an Apple-branded, licensed copy of LCSI Apple Logo) to every public and private school in the state of California, in exchange for tax breaks and a practically-assured market share (Blakeslee).

Accounts of procedural literacy are not blind to such associations between educational and software-industry organizations, as specific political-ethical invocations of literacy are implicated within such developments. What is at stake in the growing public interest in procedural literacy is the recasting of the post-Fordist landscape of computing power as a legitimate form of codified knowledge. From this perspective, the critical question is not whether any material practice, procedural system or artifact such as a programming language or a video game effectively or essentially constitutes a literacy for its subjects, but what specific constructions of literacy will further specific collective political and social goals, and how those goals are deliberated and articulated. I agree with Annette Vee's recent proposal that "a determination of whether or not a system of skills is a literacy depends on its societal context. One can be skilled at leveraging specific technologies to communicate, but a literacy leverages infrastructural symbolic technologies and is necessary for everyday life" (45). As procedural literacy continues its transition from a specialist material technology to a necessity for everyday life, the question becomes how the selective legitimation of specific forms of procedural literacy support or contradict the political and ethical goals confronting variously-constituted programming publics.

I noted the cultural resonance of Code Year as an example of the newly public revitalization of interest surrounding the potential for programming languages to become mass media of public expression, to identify the changing stakes in public procedural literacy rhetoric as a result of its increasing public participation. Within the idea of a mass literacy built around a practice of programming increasingly occupying a public stage, I find indications of broader political and ethical images of a better society, and various visions of a mass, middle-class, code-literate public that can distribute computing power and its attendant upward mobility in a purportedly democratic fashion. However, even within the academic wing of procedural literacy discourse emerging within the past decade, such political and ethical images and assumptions are rarely made an explicit facet of the concrete technologies on offer. Often, as in Bogost's work, any specific political orientation is actively effaced in favor of a systems-theoretical relativism. This is the gap I will attempt to address throughout the rest of this chapter. What ethical assumptions are involved in applying the rhetoric of literacy to specific forms of technical knowledge? What kind of public discourse is formed or imagined by a code-literate community, and what material work and social organization does it entail? How do such public calls for code literacy mediate between calls for the democratization of computer technology and theories of computerized democracy?

From Mastery to Literacy

As a first step toward addressing such questions through my own contributions toward a critical code literacy derived from a procedure-oriented reading of the idealized concept of the public sphere, I will first distinguish a cognitive-performative, operational notion of *mastery* from the ethical-political concept of a public-oriented *literacy* that is the richer target for humanities and public policy fields, in order to focus more precisely on the unique aspects of the latter in subsequent sections.

The form of knowledge I identify with the concept of "mastery" is an operational form, conceivable as a symbolic machine. A fixed body of knowledge is presented through a system of notations (a code), and the objective is to achieve operational autonomy by mastering, or internalizing, the system of signs to the point where its complexity is regulated entirely under the operator's control. Such "operational knowledge" is not necessarily a simple commodity to be passively consumed, acquired and consciously re-deployed; it can represent a more complex system to be both actively reverse-engineered and perfected as a skill to be exercised fluently, as an unconscious intuition or situational awareness. Depending on the resources already available for mapping the system's internal structure to the subject's existing background knowledge of spatiotemporal metaphor, this learning process may involve more or less experimentation, predictive modeling, or practice.

Within cybernetic systems theory, this concept of mastery in the form of regulation and control has been formalized and generalized by Ashby, and is known as the law of "Requisite Variety." In *An Introduction to Cybernetics*, Ashby introduces this law by way of a game-theoretic example: "suppose that we are watching two players, R [Regulator] and D [Disturbance], who are engaged in a game" (202). The game is based on a grid of outcomes, visible to both players, where D selects a row followed by R selecting a column. Ashby goes on to prove that "If no two elements in the same column are equal, and if a set of outcomes is selected by R, one from each row, and if the table has r rows and c columns, then the variety in the selected outcomes cannot be fewer than r/c" (206). In more general terms, "only variety in R can force down the variety due to D; variety can destroy variety" (207).

I mention Ashby's cybernetic principle only in order to reaffirm that mastery is not necessarily simple; it can represent knowledge of exceeding complexity, as long as the subject has sufficient "variety" to regulate the system's complexity. This form of knowledge accepts the system's logical rules and formalisms as a given

structure, assuming the goal of incorporating the system's complexity into one's own subjectivity, steering future actions and interpretations towards the elimination of any uncertainty and the exercise of complete control of the system. Like practicing a tennis backhand, the conditioning of such mastery through training exercises can appear as a sort of empowering repetition. Like levels of play attained by expert chess grandmasters, the pursuit of mastery may even draw upon creative or intuitive human faculties of pattern recognition or linguistic processing inaccessible to self-conscious reflection.

Subjecting one's linguistic performance to the norms of a higher structure, through mastery of its form one learns to exercise control over the system and thus partake in the sovereign power the machine promises. The classification of mastery enables and encourages the formation of identities, the construction of boundaries, and systems of inclusion/exclusion based on the recognition of difference—between the master and slave, expert and novice, professional and amateur. The expert possesses knowledge the novice lacks; the expert is thus granted an inaccessible authority beyond reach of the layman.

As computer scientist Joseph Weizenbaum observed in his 1976 study on the psychology of programming, knowledge of programming is overwhelmingly framed as a form of mastery, where it commonly induces a feeling of pleasure, even megalomania, in its subjects: "The extreme phenomenon of the compulsive programmer teaches us that computers have the power to sustain megalomaniac fantasies. But that power of the computer is merely an extreme version of a power that is inherent in all self-validating systems of thought" (130). Expert programmers have variously repeated this refrain of psychological empowerment within their practices over the years:

> The reward [for becoming a better programmer] is a more active involvement with a job you love, a feeling of mastery over an increasing range of subjects, and pleasure in a feeling of continuous improvement. (Hunt and Thomas 12)

Feelings of power and a narcissistic fascination with the image of oneself reflected back from the machine are common. (Kay 13)

Although programming knowledge is typically framed in terms of mastery in this way, this is not a necessary or natural condition of procedural literacy but an ideological and historical one. By describing conventional practices of programming-oriented procedural literacy as forms of knowledge demanding mastery of a fixed medium, I wish to distinguish that model from alternative, less-developed constructions of programming in terms of interaction, mutual understanding and language. Observing children learning Logo programming in the 1980s, Turkle offered a helpful distinction between "hard" and "soft" mastery along these lines:

> Hard mastery is the imposition of will over the machine through the implementation of a plan. A program is the instrument of premeditated control. Getting the program to work is more like getting "to say one's piece" than allowing ideas to emerge in the give-and-take of conversation. . . . [T]he goal is always getting the program to realize the plan. Soft mastery is more interactive, . . . the mastery of the artist: try this, wait for a response, try something else, let the overall shape emerge from an interaction with the medium. It is more like a conversation than a monologue. (qtd. in Edwards, "The Army and the Microworld" 101)

Edwards interprets Turkle's distinction from a more explicitly ideological perspective, noting that the division itself is false but nonetheless "plays a major ideological role" in a set of mutually-oriented relations between male-dominated computer culture, postwar militarized masculinity, and cultures of formal game-playing simulations or "microworlds": "In the microworld, as in children's make-believe, the power of the programmer is absolute. . . . For men, to whom power is an icon of identity and an index of success, a microworld can become a challenging arena for an adult quest for power and control" (109–10). In contrast to a figure of hard mastery linked to Western rationality, Edwards associates the figure of "soft" mastery with anti-authoritarian hacker subcultures, "an ongoing, intersubjective process" of communication, and "shifting, contextually specific, emotionally complex relationships" (107). It is this

latter figure of "soft" mastery that I believe begins to approach a model of code literacy with the potential for collective political and ethical agency. In the next section, I will develop a theoretical foundation for such a model of critical code literacy by drawing comparisons between computational and legal procedure within a reading of Habermas's concept of the public sphere.

3.2   Critical Code Literacy

Code As Law

Following Deleuze and Guattari's theorization of the concept of the "axiomatic" as a self-validating system of thought, Wendy Chun asserts that "software is axiomatic" to the extent that it "depends on the disciplining of hardware and programmers, and the desire for a programmable axiomatic code" (49). In its double-sided role as a system of writing and a pure abstraction of computational action that Galloway claims "is the first language that actually does what it *says*" (qtd. in Chun 22), software idealized in this way conflates executable with execution, program with process, order with action. Code is thus the contemporary version of the mystical Word made flesh, the modern-day form of *logos*:

> By doing what it "says," code is surprisingly logos. Like the King's speech in Plato's *Phaedrus*, it does not pronounce knowledge or demonstrate it—it transparently pronounces itself. The hidden signified signified—meaning—shines through and transforms itself into action. Like Faust's translation of logos as "deed," code is action, so that "in the beginning was the Word, and the Word was with God, and the Word was God." (22)

This figure of "code" as an inert, ideal intersection of abstract thought and mechanical calculation, widely adopted within the digital humanities and software industry alike, grounds popular cultures of procedural literacy in concepts of knowledge based around mastery and control of a fixed and orderly set of logical notations and

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mechanical operations. As Chun argues, this popular idea of software as axiomatic, as a logical self-validating system of thought transparently linked to computational action, is rooted in a desire for empowerment and control over an "internally consistent if externally incomplete microworld" (46).

In this section, I explore the theoretical construction of an alternate figure of procedural literacy, one opposed to this figure of software as an axiomatic, mastery-oriented form of literacy. Instead, I will develop the ethical-political implications of a figure of software conceived in terms of bureaucratic procedure, linked to communicative ideals of democratic deliberation as expressed in Habermas's interpretation of modern legal theory. This understanding of procedure as judicial process, in its complex and nuanced deliberations of competing interests and interpretations, contrasts against the relative simplicity of conventional understandings of performative utterances as simply "doing what they say." As Chun points out, citing Judith Butler's argument in *Excitable Speech*, this ideal model reflects a nostalgic desire for a simpler mapping of power, a mapping more akin to sovereign rule than structures of governmentality:

> Austinian understandings of performative utterances as simply doing what they say posit the speaker as "the judge or some other representative of the law." It resuscitates fantasies of sovereign—that is *executive* (hence executable)—structures of power: it is "a wish to return to a simpler and more reassuring map of power, one in which the assumption of sovereignty remains secure." This wish for a simpler map of power, . . . is central to computers as machines that enable users/programmers to navigate neoliberal complexity. (28)

In contrast to this simple map of power, "code as law—as a judicial process—is, in other words, far more complex than code as logos" (28). For this reason, I find the articulation between code and law, between computational and legal "codes" and "procedures" to provide a good point of departure for reconstructing procedural literacy from the perspective informed by critical theory. One area the application

of democratic principles to technical systems is within the contested interface between legal and computer code. There is a strong general pressure within the software industry towards a state of legal deregulation, including among free-software movements and software corporations that increasingly strategically draw upon open-source distribution models. The vast majority of competitive fields of software development are either self-regulated through industry-appointed standards bodies, or left to fend for themselves in a competitive, rapidly-evolving marketplace.

In line with this current of thought, a group of digital law scholars have embraced a concept originally introduced by Joel Reidenberg as "Lex Informatica," a theory of the complex articulation between the democratic system of legal regulation and the more mercantilist systems of regulation through computer technology, now more widely known under the banner of Lawrence Lessig's popular slogan "code is law." While the concept of computer code has its origins in the idea of a legal code, legal and computer systems both have recourse to a common concept of "effective procedure." While regulating desired social behavior is often ambivalently possible through recourse to either form of regulation, the technical and professional discourse among the two is so strongly differentiated that conflating the two systems entirely would be too reductive. Under Lex Informatica, the accepted position is that in areas of digital law which deal directly with the public regulation of computer systems, any effective regulatory intervention requires a nuanced, pragmatic understanding of the combined effects of both computational and legal procedure, and requires a careful consideration of the tradeoffs in establishing and maintaining effective regulation through legal and/or computer systems.

The greatest technological edifice of our contemporary global public imaginary, the Internet and its loosely-coupled collection of web technologies, today hangs precariously in a balance of competing and constantly fluctuating corporate and government interests. The modern constitution of the public Internet is a system

of codes governed not by an ideal democratic process drawing upon the informed consensus of a public conceived as collective, self-regulating authors, but by a complex, many-layered, ad-hoc aggregation of power and protocol optimized for global efficiency, written and rewritten by the fluctuating market forces of capital to capture and compete for market shares of largely powerless subjects construed as end users and technology consumers. The same may be said about the diaspora of specific programming languages, technologies and protocols that comprise the raw material of contemporary technological literacies.

The doctrine of Lex Informatica describes (and helps construct and legitimate) a porous interface between law and technology. Under this model, legal regulation of technical infrastructure is not the only avenue for intervening in technological futures against the current of market forces. If computer code indeed regulates its own production, public calls for code literacy can push beyond advocating mere mastery of public computing interfaces as end user products, and share in the same calls for assuming collective authorship and responsibility for civic justice that educators have linked to mass national language literacy as a constitutive component of participatory democracy since Dewey. In other words, a *critical code literacy*[9] can advocate not only through legal-procedural democratic norms, but it can also effect change through public critique, research and development of computing systems with the aim of producing alternative procedural frameworks.

My argument through the rest of this chapter proceeds as follows: First, through a reading Habermas's critical theory of the public sphere in the context of its historical account of the development of mass literacy through print media, I argue that the rhetoric of literacy is linked to the idealization of a bourgeois public sphere.

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[9] This term was briefly suggested by David Berry: "By highlighting the communicative dimension of social development, the need for technical education (a kind of critical code literacy), and the importance of the human at the centre of these struggles, [free/*libre* open source software discourses] contribute to a humanistic turn in engineering philosophy" (192).

Next, I compare several unique qualities of Habermas's later theory of a proceduralist paradigm of law to similar considerations in the domain of software development. After considering several critiques and proposed expansions of the concept of the public sphere that consider technical mediation and pedagogy as influencing factors, I juxtapose the public sphere as a normative, regulative ideal against theories of critical-oppositional public spheres alongside Deleuze and Guattari's theme of minor literature. From this comparison, I propose a balanced perspective that recognizes the regulative, stabilizing function of the bourgeois public sphere but focuses on the development of minor, marginal and localized forms and institutions of critical discourse. Finally, I will compare several transformative programming environment projects in order to apply this critical framework to concrete software studies, and to reveal models and tactics of potential emancipatory transformation that could be mobilized toward contemporary critical code literacy practices.

The Bourgeois Public Sphere

Habermas's influential project of Frankfurt school-informed critical social theory traces a history of the structural relation between the constitution and ongoing transformation of what he terms the "bourgeois public sphere" as a critical component of the new civil society, and the forms of self-reflexive governance and liberal democracy developed in modern European nation-states. In *The Structural Transformation of the Public Sphere*, Habermas argues that the transformation of the institutions of print media in 18th century Europe from closed mechanisms largely controlled by nation-states to spaces of critical discourse marked an unprecedented transformation in the bourgeois public sphere, introducing a new collective political force of private individuals capable of granting or revoking a power of public legitimation to the prevailing authority's legal codes. Habermas idealizes the 18th-century public sphere as "a forum in which the private people, come together to

form a public, readied themselves to compel public authority to legitimate itself before public opinion" (25–6).

The bourgeois public sphere upon which this legitimation depended was distinct from earlier forms of public presentation such as the classical Greek agora or Roman forum. Fueled in part by the development of technologies of print publication, this model of publicity was secured through an upper-middle class empowered by a newly public form of mass literacy, capable for the first time of sustaining collective, unofficial political debate beyond control of the public authorities. Habermas notes that the use of public deliberation as a medium of political resistance was inspired by and derived from the development of intersubjectivity through literary public spheres constituted by new mass genres of published novels and literary journals:

> A political consciousness developed in the public sphere of civil society which, in opposition to absolute sovereignty, articulated the concept of and demand for general and abstract laws and which ultimately came to assert itself (i.e., public opinion) as the only legitimate source of this law. . . . The criteria of generality and abstractness characterizing legal norms had to have a peculiar obviousness for privatized individuals who, by communicating with each other in the public sphere of the world of letters, confirmed each other's subjectivity as it emerged from their spheres of intimacy. . . .
>
> The self-interpretation of the public in the political realm, as reflected in the crucial category of the legal norm, was the accomplishment of a consciousness fundamentally adapted to the institutions of the public sphere in the world of letters. In general, the two forms of public sphere blended with each other in a peculiar fashion. In both, there formed a public consisting of private persons whose autonomy based on ownership of private property wanted to see itself represented as such in the sphere of the bourgeois family and actualized inside the person as love, freedom, and cultivation—in a word, as humanity. (54–5)

This eventual "blending" of the political and literary forms of public sphere constituted an ideal that became the basis for universal appeals to reason, freedom and humanity that grounded legal norms characteristic of Enlightenment discourse.

The public use of reason that served as the medium of modern, participatory democracy was established by an overlapping set of diverse social formations including *tischgesellschaften* (table societies), salons and coffee houses, all of which "had a number of institutional criteria in common":

> First, they preserved a kind of social intercourse that, far from presupposing the equality of status, disregarded status altogether. The tendency replaced the celebration of rank with a tact befitting equals. . . .
>
> Secondly, discussion within such a public presupposed the problematization of areas that until then had not been questioned. . . . The private people for whom the cultural product became available as a commodity profaned it inasmuch as they had to determine its meaning on their own (by way of rational communication with one another), verbalize it, and thus state explicitly what precisely in its implicitness for so long could assert its authority. . . .
>
> Thirdly, the same process that converted culture into a commodity (and in this fashion constituted it as a culture that could become an object of discussion to begin with) established the public as in principle inclusive. . . . Wherever the public established itself institutionally as a stable group of discussants, it did not equate itself with the public but at most claimed to act as its mouthpiece, in its name, perhaps even as its educator—the new form of bourgeois representation. (36–7)

Habermas traces the emergence of an idealized bourgeois form of public political discourse to an institutional transformation by which the rank-celebration, topic selection, and exclusivity typical of previous forms of official publicity and political influence were replaced by this "new form of bourgeois representation" based on forms of "rational communication" that were "in principle inclusive." An oft-overlooked aspect of Habermas's thesis evident in this passage is the strictly "bourgeois" nature of his conception of the public sphere: there is a structural relation between the interest of the wealthy middle class in the demarcation and preservation of their private autonomy (in terms of both property ownership and family values), and the promotion of a public sphere that would protect and preserve this autonomy. The bourgeois public sphere is effectively an idealized projection of the interests of the property-owning, family-oriented private sphere. The capitalist transformation

of culture into commodity that established the private bourgeois liberal subject thus became the very means by which the medium of critical public literacy could be conceived, as a free, secular, all-inclusive marketplace of ideas.

As a critical model, this bourgeois public sphere was rife with its own ideological contradictions, as Habermas recognized and other critics of the concept have often remarked: despite its idealization as a space of universal reason representing the common interest of humanity, in practice only literate, educated, property-owning individuals could actually participate in such public spheres of understanding, to the extent that the public sphere was in practice defined by such practical exclusions despite its rhetorical appeal to inclusivity. The concept was indeed an Enlightenment ideal, normatively abstracted from real situations of political struggle that those groups and classes excluded or marginalized from the bourgeois public sphere faced. Nonetheless, Habermas claimed that the form of self-understanding that emerged from this idealism provided a concrete legitimating function for an emerging rule of procedural law, one that morally grounded its sovereignty on a reasoning public rather than on the guarded, secret authority of public nobility: "Just as secrecy was supposed to serve the maintenance of sovereignty based on *voluntas* [will], so publicity was supposed to serve the promotion of legislation based on *ratio* [reason]" (53).

Although Habermas originally narrated the decline of this form of the public sphere in the face of corporate capture of the media and the creation of the culture industries (a thesis very much in line with the Frankfurt School tradition), his later research took a distinct turn away from the aesthetic fatalism derived from Adorno and Horkheimer's *Dialectic of Enlightenment* toward a more progressive, liberal-democratic pragmatism. Thirty years after his analysis of the bourgeois public sphere, Habermas's *Between Facts and Norms* further develops the relation between the internal structure of positive law and the process of self-legitimation of a legal system by its subjects. In this work, Habermas's theoretical methodology

shifts from historical materialism to a theory of "radical democracy," a more positive social-scientific attempt to portray an integrated society grounded in Enlightenment ideals of rational discourse yet nuanced enough to account for the complexity of modern social systems. Abstracting and removing the bourgeois public sphere from its historical, media-specific context, Habermas defines a "principle of democracy" that makes legitimate law possible in ideal, discourse-theoretic terms:

> The principle of democracy should establish a procedure of legitimate lawmaking. Specifically, the democratic principle states that only those statutes may claim legitimacy that can meet with the assent of all citizens in a discursive process of legislation that in turn has been legally constituted. In other words, this principle explains the performative meaning of the practice of self-determination on the part of legal consociates who recognize one another as free and equal members of an association they have joined voluntarily. (110)

This principle is an attempt to reconstruct the Enlightenment project of political self-determination through the abstract theoretical lens of communicative reason. As a normative ideal, it is rather a philosophical model against which institutional arrangements can be compared. The result is a discourse ethics aimed not merely towards individual competency and mastery of a given system fixed by univocal political or market power, but towards producing forms of discourse (and norms of discourse-production) that derive their legitimacy from a democratic "self-determination." However, Habermas recognizes that such an idealized, abstract principle is not found in actually existing democratic associations. Such principles are "just as unavoidable as legal constructions as they are inappropriate as models for society in toto," and are "too concrete for social theory" (80). On the other hand, he finds that modern sociology of law such as Niklas Luhmann's systems theory, which he says "conceives law only from the functionalist viewpoint of stabilizing behavioral expectations" (48), is "renouncing any connection with the normative contents of practical reason" (2), and is incapable of "restoring the explanatory power

practical reason once possessed in the context of ethics and politics, modern natural law and moral theory, philosophy of history and social theory" (2). In an attempt to reconcile these "two camps that hardly have anything more to say to one another" (6), Habermas's work proposes a legal theory that mediates between the sociology of law and the philosophy of justice, or between "facts and norms," based on a theory of communicative action that attempts to retain the normative orientation of classical practical reason but without its aesthetic totalitarianism: such a theory "no longer resides in universal human rights, or in the ethical substance of a specific community" (296), but instead "corresponds to the image of a decentered society" (301).

Procedural Paradigm of Code

Although the particular focus of Habermas's later work is on reconstructing the rational self-understanding of the legal system, the digital legal theory of Lex Informatica that emphasizes the structural correspondence between computer and legal code justifies extending such a research program toward technological environments becoming transformed into public code literacies. Next, I summarize several key themes from Habermas's reconstruction of a "procedural paradigm of law," and attempt to translate them into a more general theory of public procedure applicable to critical code literacy:

Accounting for the system complexity of modern society. One of the most pervasive themes in Habermas's later work is that modern society is distinctly characterized by a degree of immense system complexity that constantly threatens to overburden our social systems. Taking the systems theory of Luhmann and Parsons as his point of departure, Habermas argues that it was under these pressures of systemic complexity that our society's fundamental form of organization underwent a transition from hierarchical stratification to functional differentiation, separating political, economic and administrative systems into highly specialized institutions

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disconnected from everyday human experience and restricted to self-contained modes of communication and knowledge representation. However, in contrast to Luhmann's politically-neutral sociological embrace of these formally-enclosed, autopoietic functional subsystems of society, Habermas maintains that despite modernity's pressures of complexity, its functional subsystems must still be coordinated through a common social environment of communicative action, or else embrace "the brash denial of reason altogether" (3). Adapting terms from Husserl's phenomenology, he thus "distinguishes a 'lifeworld' bound to the medium of ordinary language from 'systems' steered through special codes" (55), with the medium of law functioning "as a hinge between system and lifeworld" (56).

This argument grounds the claim that an ethics of complexity is essential to a critical code literacy. Rather than an orientation that rewards practitioners with an increasingly-specialized mastery of self-contained codes and symbols cut off from everyday experience, an ethics of complexity strives for the reduction of unnecessary complexity in public code for the purpose of maintaining the "hinge" between the lifeworld of intersubjective communication and expert-oriented, complex functional systems that speak their own highly-specialized languages. Cultivated mastery of esoteric, specialized codes steeped in enigmatic abbreviations or private metaphors should be supplemented by a greater possibility of broad public understanding of technical concepts and structures, illustrated through collectively-authored vocabularies and languages that draw upon a common cultural background shared by as many potential practitioners as possible. Snow's remarks on computing cited earlier mirror Habermas's equally pervasive distrust of the tendency for expert discourse to become self-enclosed and autonomous in relation to the public it claims to represent, a situation which Habermas argues leads to "illegitimate power." An ethics of complexity thus points toward a critique of the cognitive burden of complex codes on

a people's capacity for understanding, as well as the forms of expert knowledge and professionalism such complexity ultimately authorizes and makes necessary.

Establishing a postmetaphysical discourse ethics that structurally links, but does not reduce or conflate, law and morality. With his endorsement of a proceduralist paradigm of law, Habermas argues for a balance between a purely formalist legal system that eschews moral claims entirely, and a system that derives its power directly from a single moral authority such as a dominant system of religious or community values: "Even if moral considerations are not selective enough for the legitimation of legal programs, politics and law are still supposed to be compatible with morality—on a common postmetaphysical basis of justification" (453). Here, "postmetaphysical" is a term Habermas uses to mark his distance from metaphysics in general (and modern, post-Kantian philosophies of subjectivity and consciousness such as those of Hegel and Marx in particular) as well as to signal his alignment with American philosophers such as Rawls, Rorty and Dworkin. As a postmetaphysical philosophy can no longer assume the role of providing "criteria of validity," all that remains for it is to "mediate interpretatively between expert knowledge and an everyday practice in need of orientation" (*Postmetaphysical Thinking* 17).[10]

In this pragmatic, mediating model, autonomous public spheres become the primary source of moral communication, where everyday practices of concrete forms of life are able to influence the institutionalized processes of otherwise autonomous, expert systems. In this capacity, Habermas has described the public sphere in mechanistic terms as a "a far-flung network of sensors that react to the pressure of society-wide problems and stimulate influential opinions" (*Between Facts and Norms* 300), a "sounding board" and a "warning system with sensors" (359). As a central lifeworld mechanism charged with mediating between expert knowledge and everyday practice, the public sphere idealizes a model of deliberation that, as

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[10] See Habermas's essays in *Postmetaphysical Thinking* for further development of this position.

Habermas emphasizes, is particularly attentive to individual life experience: "Systemic deficiencies are experienced in the context of individual life histories; such burdens accumulate in the lifeworld. . . . Problems voiced in the public sphere first become visible when they are mirrored in personal life experiences" (365). Although this model of public spheres is not entirely reducible to such personal experiences of "systemic deficiencies" and injustice, it appeals to them in the first instance.

Along these lines, I agree that a morality of code must similarly establish a link between code and morality that is neither collapsed into a reductive technological autonomy nor dissolved entirely into a naive technophobia. Instead of either passively accepting our inherited technical system as morally determined, or opportunistically declaring that code is value-free without any relation to the moral norms of specific groups, we should strive to establish processes of technical governance and standardization that remain open to moral arguments that draw from personal, human experiences of injustice, inequality, or other such "systemic deficiencies" that affect the experience of everyday lives.

Here, I have in mind a perspective on technical discourses of "user experience" that have informed the design of technology since the mid-1980s, particularly as represented in the 1986 collection of essays titled edited by Don Norman, and his later influence on Apple Computer's interface design practice. This framework of user-centered system design, designed "User Experience" at Apple in the mid-90s (Norman, Miller, and Henderson see), is a design methodology that incorporates information about the actual (or anticipated) experience of a product's users into future design iterations, the end result being a product that better serves the end user's needs. Traditionally, this field has focused on cognitive and psychological human factors related to the use of complex systems, with reducing deficiencies in usability as a primary moral concern. Along these lines, Latour argues that a "missing mass of morality" can found in the design of non-human technical artifacts, which impose

their morality upon humans through material prescription of behavior, the "moral and ethical dimension of mechanisms" (Latour, "Where Are the Missing Masses?" 157). He illustrates this dimension through a hypothetical discussion of a door closing mechanism:

> To be sure, the hydraulic door closer does not bang the noses of those unaware of local conditions, so its prescriptions may be said to be less restrictive, but it still leaves aside segments of human populations: neither my little nephews nor my grandmother could get in unaided because our groom needed the force of an able-bodied person to accumulate enough energy to close the door later. To use Langdon Winner's classic motto (1980): Because of their prescriptions, these doors discriminate against very little and very old persons. (158–9)

As Latour hints at in this discussion of the morality of mechanisms, as the design of software interfaces address themselves to increasingly mass publics, such moral discourses of "user experience" should expand accordingly to accommodate increasingly complex discourses and negotiations among diverse populations. Such discourses must shift their moral perspective from an individual, cognitive emphasis on "the user" to address experiences among multiple and varied populations of users, categorized along relevant axes such as age, socioeconomic status, race, gender, and nationality, for example.

Distinguishing the efficiency or instrumentality of procedure from alternate forms of legitimacy. Habermas's theoretical work maintains a consistent adherence to the critique of instrumental reason that originated in the social theory of the Frankfurt School. Habermas's distinction between system and lifeworld translates certain themes of a classical Marxist class analysis into a Parsonian structural-functional framework. He analyzes various forms of "legitimation crisis" within welfare state democracy, characterized in later work as lifeworld "pathologies," particularly the "colonization" of the lifeworld by system structures that pose a modern threat to social solidarity. The normative focus of Habermas's work is

oriented toward a critique of the self-sufficiency of instrumental reason within modern democratic societies. In certain deliberative, democratic contexts, arguments and reasons provide the public legitimacy to decisions that purely systemic media such as money and administrative power cannot provide. In this context, Lyotard's recognition of "paralogy" as the proper form of legitimation within postmodern science (60–66) is the classic expression of opposition to the focus on univocal performance and efficiency found in twentieth-century positivist ideologies.

In relation to code literacy, this disjunction of efficiency and legitimacy can form the basis of a critique of efficiency as a response to a pervasive black-boxed, purely technical relation to code where operational efficiency is a primary determining value. Evaluating existing, highly-technical systems against more diffuse institutional values and moral norms is a good starting point for a substantial method of code critique that extends beyond goal-oriented performance metrics and Taylorist management practices all too common in the history of computing practice. Here, I have in mind the influence of twentieth-century managerial practice on the development and codifications of programming practice, and associated myths and ideologies that have become commonplace in computing culture that compromise the background knowledge of code literacy. One prominent example of this is the persistent myth of the "10x" or "superprogrammer" among software professionals, a claim that software researcher Steve McConnell demonstrates is supported by decades of productivity research suggesting that "there are order-of-magnitude differences among programmers" in terms of workplace productivity ("What Does 10x Mean?").[11]

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[11]See also McConnell's ("Productivity Variations Among Software Developers and Teams").

Expanding the public sphere

I find in Habermas's discourse theory a set of criteria by which we can critically estimate the legitimation of procedural norms in relation to a public use of reason, but this is where a strict reading of Habermasian ideals of the public sphere reaches its limitations.

First, as I have addressed by expanding these communicative principles to the domain of computer programming languages, I believe that the legitimation criteria Habermas outlines shouldn't be limited to official, institutionalized legal procedure. If recourse to democratic principles is to be upheld in complex procedural environments regulated both by legal institutions and computer systems, and if claims for the potential constitution of a code-literate public are to have any lasting significance, code literacy advocates must make the case that such a public can and must assume responsibility for the self-regulation of its technological systems according to similar democratic principles.

Second, although Habermas's work is a powerful affirmation of the legitimation of norms through the self-constitution of legal systems, he fails to include the possibility of the critique of technology design in his theory; rather, according to several accounts, Habermas actively resisted incorporating the public spread of computer-mediated communication into his later work by attributing essential ideal communicative qualities to a physically-embodied "face-to-face" encounter and the living, natural language of the lifeworld that the legal system draws upon and that can't be replicated in other institutional forms. Responding to Habermas's claim that "The publics produced by the Internet, . . . remain closed off from one another like global villages" (qtd. in Poster, *What's the Matter with the Internet?* 116), Poster argues that Habermas "clearly has got things wrong" (116), because electronic media systematically deny the sorts of political organization that Habermas's theory models:

> For Habermas, the public sphere is a homogeneous space of embodied subjects in symmetrical relations, pursuing consensus through the critique of arguments and the presentation of validity claims. This model, I contend, is systematically denied in the arenas of electronic politics. We are advised then to abandon Habermas's concept of the public sphere in assessing the Internet as a political domain.[12] (181–2)

Despite any productive engagement with computer-mediated sociopolitical organization in his later work, abandoning Habermas's concept of the public sphere entirely due to recent technological changes in communication media would be throwing the baby out with the bathwater. Instead, I find Kellner's critical analysis of Habermas's work on the public sphere to be a productive middle ground of generative critique. Though Kellner argues that "Habermas' project is undermined by too rigid categorical distinctions between classical liberal and contemporary public spheres, between system and lifeworld, and production and interaction" ("Critical Intervention" 281–2), he nonetheless applauds Habermas for having produced a project which "has generated a wealth of theoretical discussions and has provided normative bases for social critique and democratization" (271) For these latter reasons, Kellner proposes to expand Habermas's concept of the public sphere in recognition of its contributions to participatory democratic theory: "An expanded public sphere and new challenges and threats to democracy render Habermas' work an indispensable component of a new critical theory that must, however, go beyond his positions in crucial ways" (282).

Kellner's "critical intervention" links the public sphere to a critical media pedagogy through an emphasis on a more expansive notion of the multiple cultural and technological literacies necessary for democratic participation in multicultural

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[12] Brun similarly laments that Habermas's recent work demonstrates an "obvious aversion to accepting the Internet as part of the public sphere," citing a paper in which Habermas dismissed the democratic potential of computer-mediated communication over the Internet as "the rise of millions of fragmented chat rooms across the world" that merely produces "isolated issue publics" (qtd. in Brun). Rheingold shares a similar impression that Habermas "simply does not understand the Internet."

society.[13] While attending more closely to the significant state and corporate interests that have shaped the technological infrastructures of television and radio broadcasting systems, he exhorts the "critical-oppositional intellectual" to intervene within these technologically-mediated public spheres on behalf of social causes: "intellectuals in the present moment must master new technologies and, . . . there is thus a more intimate relationship between intellectuals and technology than in previous social configurations" ("Intellectuals and New Technologies" 438). Such an argument leads to a concept of critical technological literacy that links individual technological empowerment to social change. However, Kellner falls back upon the passive trope of mastery and tool-use, writing that "computer literacy involves technical abilities concerning developing basic typing skills, using computer programs, accessing information, and using computer technologies for a variety of purposes ranging from verbal communication to artistic expression" ("Multiple Literacies" 116). This does not adequately interrogate the formation and evolution of technologies themselves, and overlooks how the design of interfaces, codes and standards necessary for participation in public spheres based on new technologies can themselves produce or reinforce the sociocultural inequalities that egalitarian efforts to provide access and education will not alleviate.

Returning to my earlier example, such a model of computer literacy would go no further than the educational model of Codecademy, emphasizing "hard mastery" of the syntax and affordances of the dominant Internet communication vocabularies and platforms such as HTML, CSS and JavaScript, perhaps even higher-level web application products such as WordPress or Blogger, as methods of

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[13] Kellner gestures toward this focus in his critique of Habermas: "[Habermas] omits the arguably necessary presuppositions for democratic deliberation and argumentation—an informed and intellectually competent citizenry. Here the focus should arguably be on education and the media, for schooling and the media play a key role in enabling individuals to be informed, taught to seek information, and, if effectively educated, to critically assess and appraise information, to transform information into knowledge and understanding, and thus to make citizens capable of participating in democratic discussion and deliberation" ("Critical Intervention" 277).

empowering upwardly-mobile communities to participate in social and political expression through conventional forms of computer-mediated communication. While undoubtedly progressive, this model of critical media literacy tends toward a passive, pragmatic embrace of useful technological skills, which are largely commodified and guided by corporate interests. Because the production and control of technical literacies, platforms and standards are increasingly important activities in contemporary social struggles over emerging forms of public digital communication, they should also be included within the scope of a critical literacy and subject to the normative scope of an ideal public sphere of democratic participation. Such an emphasis on technical production would be a starting point for a model of social research that would effectively link Kellner's inclusion of media literacy within an expanded public sphere to the technical forms of procedural literacy that Bogost, Mateas and others have espoused.

Another group of criticisms leveled against Habermas's bourgeois public sphere concept (e.g., Negt and Kluge; Fraser; Warner) have advanced a more fundamental critique that can't as easily be accommodated by a progressive expansion of the concept of the public sphere, but demands a dialectical reconsideration of the Enlightenment ideal of public reason itself. The general argument of these and other similarly critical positions is that marginalized groups remain excluded from the idea of a public sphere presumed to be universal and unified, and in the argument's strongest form, such idealized public spheres are fundamentally constituted by such exclusions. For example, Fraser notes that in the Enlightenment-era periods from which Habermas derived his initial model of the bourgeois public sphere, women, racialized ethnicities and the plebeian classes were often formally excluded from official political participation as well as informally marginalized through dominant social-cultural protocols of style and decorum. Warner critically reads the bourgeois public sphere as a "minoritizing logic of domination" (384), and "a

logic of abstraction that provides a privilege for unmarked identities: the male, the white, the middle class, the normal" (383). From these perspectives, the public sphere as a singular ideal of universal, democratic participation is reimagined as a normalizing model of liberal-pragmatic hegemony, against which a plurality of radical, oppositional, minoritarian public spheres contend.

Third, as a thematic summary of the above critical responses to Habermas's communication-theoretical construction of the public sphere, I take Deleuze and Guattari's multivalent figure of minor literature as a representative image. In his study of Deleuze and Guattari's concept of "minor" politics, Thoburn writes that "Whilst the minoritarian is concerned with expression, . . . such expression is not 'communication' in the sense of the manifestation of an identity or a process of bringing people into a public sphere where all may be heard. The question is rather one of the invention or creation that occurs in a cramped space" (20).

Taking this critique into account, I propose a hybrid approach that acknowledges the pervasive and necessary component of the functional differentiation of society that produces specialized systems and forms of expert knowledge, but also necessitates a critical component that resists the passive, technocratic totalization and domination of those forms. Critical code literacy advocates and cultivates not just technical mastery but informed technical critique. What will such a critique look like in practice, applied to the kinds of code we find at work in computer systems? In the following section, I will transition from the above discussion of the theoretical foundations of a procedural literacy grounded in ideal public spheres to develop a more concrete practice of critical software study emerging from these principles. To this end, I will look beyond the merely cognitive dimensions of programming notations and the technical efficiency mastery of a given technical code may offer an individual user, in order to form an ethical-political critique of a procedural literacy

whose legitimacy derives from its status as language, governed by the mass public it addresses.

3.3 Critique of Programming Language Systems

I have developed a concept of critical code literacy derived from Habermas's ideal of democracy linked to a public sphere constituted by literate civil society, extended with several modifications. This concept of public literacy extends beyond a liberal-individualist, cognitive or skill-oriented notion of mastery to incorporate an ethical responsibility towards a critical self-reflection on the relation to the public sphere toward which a particular code's adoption is addressed.

In this section, I shift from theory to a more practical exploration of potential avenues for critical action within the specific domain of contemporary programming language systems. To accomplish this, I take guidance from Feenberg's concepts of the ambivalence of technology and alternate modernities, which synthesize a reading of Habermas, Marcuse and Foucault into a critical theory geared toward a critique of technological rationality. Agreeing with Kellner that Habermas "ends up pessimistically decrying the rising tide of technocracy without providing a persuasive alternative" ("The Technocracy Thesis Revisited" 85), Feenberg's work offers a critical theory of technology embedded in political praxis:

> All modern industrial societies stand today at the crossroads, facing two different directions of technical development. They can either intensify the exploitation of human beings and nature, or they can take a new path in which the integrative tendencies of technology support emancipatory applications. The choice is essentially political. The first path yields a formally biased system that consistently reinforces elite power. The second path requires a concretizing application of technical principles, taking into account the many larger contexts on which technology has impacts. These contexts reflect potentialities—values—that can be realized only through a new organization of society. (*Transforming Technology* 188)

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This new organization of society that Feenberg imagines is not a preconceived utopian totality, but merely the possibility of an alternative form of modernity based on indeterminate social values and human practices not reduced to a technical relation of efficiency: "Nature as a context of development is, . . . a dialectical limitation that invites transcendence through adaptation. . . . Adaptation maintains the formal character of the modern concept of freedom and therefore does not reduce individuals to mere functions of society. Freedom lies in this lack of determinacy" (190).

Feenberg argues that the democratization of technology requires the subject to not only contextualize existing technology design as socially and historically constructed, but also to consciously and productively inherit, adapt and reconstruct such existing designs according to concrete values and principles. I find that this argument extends Habermas's general theory of ethical-political discourse, as "affirmation of a form of life in light of critically appropriated traditions" (*Between Facts and Norms* 163), into the domain of technological artifacts. Taking inspiration from Feenberg's philosophy of technology, I will examine how concretizing, emancipatory applications of technology emerge in the context of contemporary procedural literacy through a critical comparative analysis of several programming language systems that aim to transform procedural literacy through technological design.

From cognitive usability to ethical-political counter-hegemony

Before this case-study comparison, I wish to further clarify how my critical approach to public software contributes to an ethical-political discourse of software, as distinguished against existing forms of discourse within the field of software studies. To demonstrate this difference I rely on Green's "Cognitive Dimensions of Notations" framework, a well-known heuristic of system usability commonly applied to the analysis of programming languages and environments. In this heuristic, a "cognitive

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dimension" of a notation is a "characteristic of the way that information is structured or represented, one that is shared by many notations of different types and, by its interaction with the human cognitive architecture, has a strong influence on how people use the notation and affects whether the strategy of opportunistic planning can be pursued" (448). This framework evaluates the cognitive implications of an idealized user's adoption of a specific notation. In his original paper, Green analyzes the SmallTalk programming language, noting how certain choices in the design of its notation encourage or impede specific types of language use according to several broad cognitive dimensions.

To develop a mode of critique of programming language systems, I propose a translation of Green's analytical framework from an assessment of a notation's cognitive dimensions into ethical-political ones as outlined in my previous section. One of Green's more celebrated cognitive dimensions, "viscosity," is defined as a notation's "resistance to local changes," which he uses to compare the effect a choice of notation has on the cognitive burden to make incremental, isolated changes. For example, changing the name of a single variable may require the programmer to also update all of the references to the object throughout an entire program, which can be a significant burden in programming environments where this change is not automated. By extension, I propose we assess a programming environment not just with regards to cognitive viscosity in terms of a notation's cognitive resistance to local changes within a given program but also with regards to its ethical-political viscosity, in terms of its resistance to broader changes to a language itself in response to ethical-political arguments that arise from within the public spheres of its projected audience.

For many software professionals, the various notations, idioms, and technical-cultural vocabularies and histories common to all mainstream programming languages have either become so naturalized as a basic, universal structure of

rational-computational thought, or justified according to globalizing logics of efficiency, market dominance, technical standards and industry best practices, that it is difficult to imagine any ethical-political argument cutting across them. Why would the syntax, grammar, or vocabulary of a programming language have ethical or political implications, as long as its users can acquire the necessary literacy to meet their immediate needs? This is the question a critique of programming language systems should address.

I should also distinguish such a focus on ethical-political arguments from common forms of free/*libre* software advocacy and software studies research. On the one hand, Richard Stallman's campaign for free software is a popular, influential, explicitly ethical response to the commodification of culture in the form of proprietary software; however, as David Berry has noted, the Free Software Foundation has failed to "widen its discourse from that of deontological ethics and community-shared processes for the production of social goods to that of a wider discourse of democracy" (185), short-circuiting discussions of the political implications of the project's libertarian-leaning ethical standpoint, resulting in a sort of "union or guild-like structure for computer programmers" (101). Within software studies research I take Lev Manovich's *Software Takes Command* to be a representative example which, although generally supportive of open source software, displays an instrumental attitude towards the production and consumption of software by focusing on popular software packages without addressing ethical-political legitimacy. Manovich chooses to discuss "Photoshop rather than Gimp, and Illustrator rather than Inkscape" simply because the former software products are more popular, because his interest is in "describing the common user experiences, and the features of media aesthetics common to millions of works created with the most common authoring tools that are all commercial products" (50–1).

One response to such normalizing approaches to technology studies, drawing parallels to critical accounts of "Global English," involves the assertion of cultural-linguistic diversity and minority as a form of resistance to monolingual technocratic colonization. Along these lines, I consider the following anecdote from Yuri Takhteyev's ethnography of Brazilian software development, where a couple of young professionals discussed the story of a failed Microsoft project to translate the company's Visual Basic scripting language to Portuguese:

> This must be one of the stupidest ideas ever! they exclaimed at the same time. How would you even do it? asked Fabio. . . . Portuguese just isn't a good language for programming languages. The grammar is too complex. What would you write in the end of the function? "Retorno"? "Retorne"? "Retornar"? . . . In English it all makes more sense, he concluded.
> Fabio's comments about the idea of using Portuguese keywords as keywords in a programming language do not merely acknowledge the de facto dominance of English in software, but also naturalize this dominance. (53)

The naturalized dominance of English-language programming languages that made the idea of using keywords in any language other than English unthinkable to these young Brazilian programmers was maintained by the domination of local software industries by the products, platforms and technologies of English-speaking American corporations, compounded by general English-language hegemony in multinational business. The essentially English-language logic of software has been recognizably linked to global business and politics since at least 1984, when Steve Jobs commented to the French president Francois Mitterrand on a visit to Silicon Valley: "The problem with French software, Mr. President, is that it's written in French. You can't sell it" (qtd. in Dobbs B4). In response, Mitterrand voiced his frustration with Silicon Valley's English-language technocultural power at a 1986 meeting of the French Academy, asking, "Must we translate into English the orders we give machines?" (qtd. in Dobbs B4).

Joe Lockard's account of the arrival of "cyber-english" as a "superdominant english specifically intrinsic to a computer-mediated technology base" raises the possibility of "counter-hegemonic software development" (Lockard), a critical perspective that Rita Raley advances by "illustrating a link between the mechanized code of machine languages and an updated pasigraphy" (306): "With Global English as a precursor network and medium of late twentieth-century communication, computer languages maintain a parallel currency and legitimation" (307). Such arguments link the desire for universal language, whether in the form of Global English or the mass adoption of monolingual programming languages, to purely instrumental views of language as the communication of information, and of literacy as developing mastery of an external relation to dominant structures of knowledge and power.

Programming Languages as Social Practice

I will next analyze and compare several programming languages from a perspective considering not just their abstract cognitive utility or set of features and functions, but also their formation and governance as concrete social practices in relation to specific populations and histories. I wish to shift from a notion of programming that affords abstract procedural power to a generalized user-subject to a concept of programming as a social practice, one that articulates global technocultural platforms to local, concrete social histories and vice versa. Through a comparison of JavaScript against the alternate projects of Processing and DrScheme, I suggest that the latter offer particular models of public programming that productively diverge from the adoption of languages organized through technical consensus.

JavaScript

JavaScript's relatively simple syntax, error-tolerant grammar, and particularly its early adoption within a majority of web browsers cemented its place in the global Internet economy. Thanks to the commitment of all major web browser developers to interoperable, standards-based implementations of JavaScript (Microsoft Internet Explorer, Mozilla Firefox, Apple Safari, and Google Chrome), and their active participation in the language's ongoing standardization process and evolution within the ECMA organization, programs written in JavaScript are able to execute relatively uniformly across a large share of the modern web's computing platform infrastructure. As the programming platform with the largest market share of web browsers, JavaScript is viewed today as the Global English of the Internet, or the "programming language of the web" (Codecademy).

JavaScript's long rise to prominence within the software industry can also be attributed to an effective strategy of constituting an expansive technical public across a dominant majority of the software industry through partnerships, marketing, licensing and standardization. Originally designed in 10 days as an internal extension for Netscape's Navigator 2.0 web browser, JavaScript was publicly announced in 1995 in partnership with Sun and marketed as "complementary to and integrated with" HTML and Java, Sun's then-dominant programming platform that could also run simple programs (called "applets") on web pages through its own browser extension ("Netscape and Sun Announce JavaScript").[14] Over the next year, Netscape and Sun deployed a particular strategy of public technical governance, "work[ing] closely with ECMA, IETF, WC3 [sic] and others to advance Java and JavaScript as the standard development environments for Internet and Intranet applications," aiming for "the establishment of JavaScript as an open Internet standard" ("Industry Leaders").

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[14] See also "JavaScript: Designing a Language in 10 Days" (Severance).

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JavaScript's reputation as an open standard became the focus of a public controversy surrounding Apple's decision to unilaterally ban Adobe's Flash platform from its popular iOS devices in April 2010, a controversy that tech journalists later linked to Flash's decline and JavaScript's subsequent rise to prominence as the central programming language component of the HTML5 platform.[15] The Flash platform and its ActionScript programming language are also made available free of cost to developers, but its design is decided entirely by Adobe and is subject to more restrictive licensing agreements. Running a Flash program on a device requires users to install a runtime of proprietary compiled software, developed and maintained by Adobe, providing programs written in ActionScript/Flash high-level functions such as a graphical canvas and device input. Although developers may access documentation, API references and function libraries to author Flash programs, the underlying software actually implementing these functions on specific machines is privately held as a copyright and trade secret essential to Adobe's proprietary licensing model.

Despite JavaScript's reputation for openness, however, the software-industry consensus that JavaScript represents can also be viewed as a sort of liability and a form of resistance against socially-induced change. In contrast to the public legitimacy accorded to legal codes developed through equitable constitutional procedures (where, for example, the display of illegitimate influence such as political corruption or unethical lobbying could prompt public controversy with future political consequences), the specification and standardization of JavaScript through ECMA's institutional oligarchy of software industry professionals does not provide any substantial opportunity for critical public deliberation on behalf of the non-professional publics that mass code literacy campaigns such as Codecademy address. Without a more open incorporation of broader public interests and the

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[15] See (Jobs, "Thoughts on Flash"). Many tech pundits later attributed Jobs's public feud with Adobe for "killing Flash" (e.g., Manjoo; Isaac; Lawler).

possibility of public controversy to impact the procedural authority of the oligarchy itself, nothing in its constitutional structure would prevent stakeholders from accepting design aspects that may further private interests at the expense of the public. For example, design decisions making the language more complex or difficult for non-professionals to understand or adapt (for example, the unique behavior of JavaScript's undefined primitive or its prototype-based inheritance chain, or the addition of new functions in the language's standard vocabulary, or the verbosity of its standards documentation) may be less costly for ECMA's voting constituency of software professionals to develop the requisite expertise compared to the broader public affected by such design choices.

Although I find Geoff Cox's assertion that "JavaScript is proprietary, indeed owned by Google" (83) a bit hyperbolic, I do agree with the general sentiment expressed by Berry that "Web 2.0 companies, such as Google" can be understood in light of the "co-option of FLOSS [free/libre and open source software] into new models of production" (xiii), resulting in an industry-oriented standard not equally open to a broader mass public. To the extent that such a mass public is excluded from participating in the JavaScript language's industry-oriented evolution, efforts directed towards technical education in details of the language can be viewed as developing a technical-vocational mastery as opposed to advocating a more critically-reflective public form of literacy. A bureaucratically-designed language such as JavaScript allows non-professional practitioners to develop a functional literacy relatively quickly, but such literacy is so heavily determined by the oligarchical motivations of its industry designers that it actively shields the learner from the deliberations and decision-making processes that formed its environment in the first place, ones that might otherwise be contested within a differently-constituted public. Learners may indeed be empowered by JavaScript's functional ability to create web applications that can be executed on a majority of modern browser platforms across a wide range of

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software and hardware vendors, but the notation's political viscosity also nonetheless imposes a technical-linguistic dominance upon those minor languages and cultures less represented within its technical consensus.

Processing

Processing is a special-purpose programming framework that I contrast against JavaScript to emphasize differences both in its constituted public as well as the governance of its language's development. Developed around 2000, Processing is technically not a full-fledged programming language of its own but rather an API (application program interface) layer on top of Sun's Java programming platform.[16] Despite inheriting Java's technical infrastructure and low-level syntax and grammar, the design of Processing incorporates several sustained critiques of the implicit context of mainstream, general-purpose, professional programming environments, including that of Java itself. Through its streamlined, simplistic interface and its promotion and cultivation of an open-source, do-it-yourself community of non-programmers, it exemplifies a radical reappropriation of an existing technology platform for alternate ends.

In his dissertation titled "Computational Information Design," Processing creator Ben Fry describes his project as "a tool for developing visually-oriented software. It was conceived of as a way to introduce programming concepts to designers, and design concepts to programmers" (123). In contrast to industry-standard programming languages such as Java or C++ used by professional programmers across all sectors of the software industry, the Processing environment was built to support a particularly narrow application domain, one directly suitable for the information visualization goals of the artists and designers within the

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[16] The Processing API was also later ported to the JavaScript platform as a sister project, Processing.js.

Aesthetics and Computation Group (ACG) at the MIT Media Lab. Many of Processing's key features were an evolution of Design By Numbers, an earlier project headed by ACG director John Maeda, and Fry mentions that Processing "began as a 'next generation' Design By numbers" (125). Both frameworks were used extensively in the ACG's own research and experiments.

The notable functional differences in Processing are evident in the environment's streamlined graphical user interface (GUI) and application programming interface (API). First, with its simple GUI, Processing subverted the text-based, command-line paradigm typical of most programming languages (e.g., type, compile, run, debug) by providing an interface containing parallel code-input and graphics-output windows, along with intuitive graphical play and stop icons to control program execution through a familiar analogy to consumer electronic devices. These features, along with free program distribution and a simple installation process, made it possible for visual designers to begin scripting simple visualizations without demanding knowledge of computers beyond familiarity with the Windows operating system. Second, the Processing API was intentionally designed with a minimal set of functions relevant to interactive graphics applications, "designed to be terse vocabulary that provide only the most relevant features used by the greatest majority of users" (129). Additionally, Processing hides complex Java concepts such as classes, packages and library imports behind scaffolding built into the program editor, so beginners are no longer confronted with confusing, abstract program semantics of required lines of boilerplate Java code such as "`public static void main(String[] args) {}`" before programming simple visual actions like "`line()`" to draw a line or "`rect()`" to draw a rectangle.

These various features, largely oriented toward abstracting the existing Java platform in the direction of accessibility, ease of use, and reduced complexity for the specific purpose of authoring specific genres of visual media, have made Processing

a favorite among procedural literacy advocates (e.g., Mateas 110; Manovich 105). Although I also commend such technical innovations for instrumentally supporting the "quick development of media projects" (Manovich 105), I wish to further emphasize the project's particular model of open governance structuring its evolving social practice in relation to a specifically-constituted community of (non-expert) practitioners. Along these lines, it can be argued that the regulative structure of the Java ecosystem from which Processing emerged had systematically excluded the interests or concerns of the class of end user programmers that constituted the Processing community, who could better participate in a separate programming paradigm. It is also worth noting that, in addition to being a free and open-source project, Fry institutionalized the ongoing governance of the language through the Processing Foundation, a nonprofit established in 2013 which notes that its largest source of funding comes from individuals donating less than $100.

Lacking the aspiration to abstractly represent a unified, universal, public programming community, Processing exemplifies what Bonnie Nardi has called "end user programming," the design of a restricted programming environment within an application-specific domain. In this way, Processing is comparable to other restricted programming environments such as spreadsheet scripting languages. Such projects advance the question of "one or many programming languages?" in favor of the latter, demonstrating that something can be gained by adapting a programming environment toward specific application contexts. However, in contrast to Microsoft Excel, for example, I believe that the steps Processing has taken to establish a sustainable model of community-driven governance better exemplifies the construction of a public sphere established in a reciprocal relationship to its participants than other end user programming platforms demonstrate.

DrScheme

My final case study concerns the relationship of public education standards to the constitution of procedural literacy for a mass public. While Processing emerged from and is designed for an existing community of new media practitioners and visual designers and can be understood considered within this bounded, application-specific context, a rising tide of contemporary procedural literacy advocacy reaches beyond specific end user programming contexts in attempts to teach universal principles of "computational thinking" (Wing) not as a special skill but as a basic literacy, alongside elementary mathematics and English. DrScheme is one such early project that, while not as widely adopted as JavaScript or even Processing, presents a unique model of integrating procedural literacy within public education worth considering in the context of public sphere criticism.

The DrScheme programming language environment was constructed by Felleisen et al. for the "TeachScheme!" project, an educational initiative that "aims to move programming courses into the core of secondary school curricula" (57). In their paper titled "The TeachScheme! Project," Felleisen et al. find fault with existing computer science curricula, such as introductory courses teaching Java and similar industry programming languages, for their "prevailing but outdated view of programming as a vocational activity. Secondary school educators and administrator [sic] simply don't understand the power of programming and its potential role in the core of a liberal arts curriculum" (56). Specifically, by training in "vocational" programming languages and using complex, professional development environments for software composition, "investing energy into the study of complex grammars and programming environments distracts teachers and students from the true nature of programming" (56–7). In order to improve upon current state of programming education, the authors developed DrScheme, a combined program development environment (PDE) and a hierarchical, curriculum-oriented series of programming

languages designed to introduce programming concepts to beginners. Derived from the Scheme programming language (itself a minimalist variant of Lisp, as was Logo), this progressive series of language environments begins with a basic functional language that mirrors the syntax of basic algebra as closely as possible, growing to support more advanced functional language constructs such as assignment operators and eventually introducing the "notoriously difficult notion of state in programs" (60), which is typically a more fundamental, introductory concept in mainstream programming languages.

The convincing argument the authors use to advocate using their curriculum to teach programming instead of more widely used, industry-standard languages such as C++ or Java is that the functional style and syntax of DrScheme enables its core concepts to be more directly grafted onto existing K-12 mathematics instruction standards (particularly algebra), suggesting that DrScheme's language constructs integrate more easily into the existing institutional codification of elementary education: "An animation is a mathematical function (from time to scenes); an interactive, graphical program is a mathematical expression; and a family of web pages is the result of some more mathematics" (Felleisen 129).

Felleisen describes later experimenting with designing a transition curriculum, intended to translate the basic concepts learned from the TeachScheme! program into real-world programming: "On the downstream side, students must see how the design principles in HtDP [How to Design Programs, a book describing their program design method] apply to class-based, object-oriented languages such as Java. These languages are what students need for their first co-op or internship" (130). This suggests that even though the streamlined model of computing offered by the DrScheme programming environment has stronger affinities to the form of mathematical concepts encountered in the classroom, the TeachScheme! project still

believes that a hybrid or transitional segment is still practically necessary to link these concepts to industry.

One of the most interesting aspects of the TeachScheme! curriculum is that it combines careful design changes to the syntax and grammar of a standard programming language environment with changes to the design of a computer science educational curriculum. However, I believe this emancipatory potential is largely stifled by the curriculum's strategy of simultaneously integrating with (and implicitly adopting the instrumental pedagogical attitudes of) existing K-12 math standards and industrial software practice. In this context, the specific details and nuances of the DrScheme language and its development environment emerge as a technological optimization of existing, externally-defined pedagogical goals rather than as a vision of a new form of code literacy constituted within a mass public. Its radical design critique of industrial programming languages through its use of scaffolding and functional programming constructs would be more convincing if also articulated with an expanded vision of computational thinking that extended beyond more engaging algebra instruction, or more efficient training for future Java engineers. Otherwise, DrScheme remains a toy programming language for young preprofessionals, a preparatory pedagogical tool in the service of existing coding paradigms, and constrained by the necessity to transition its students into the "real world" of global software development.

The tensions revealed within DrScheme and the TeachScheme! project reflect potential articulations and oppositions between the institutions of elementary public education, software industry standardization, and alternate, critical-oppositional or emancipatory concepts of literacy. Although TeachScheme! provides a productive model for aligning procedural literacy with public institutions of education, thus potentially relating to a mass public in a way that a programming environment built around industry consensus such as JavaScript could not achieve, it remains an open

question whether such a project could be effectively linked to a more transformative literacy project that would not just enhance existing pedagogy standards but transform literacy practice in the process.

3.4   Conclusions

Computers' use of symbols, like the use of symbols in language and mathematics, is sufficiently disconnected from the real world to enable them to create splendid nonsense. . . . It is just this realm of apparent nonsense that must be kept open for the developing minds of the future. Although the personal computer can be guided in any direction we choose, the real sin would be to make it act like a machine! (Kay 244)

The discussion within this chapter is still far from concluding the open debates and ongoing developments of procedural literacy; rather, my primary contribution has been to open up the relatively narrow debate to the broader political and philosophical themes of the public sphere, in order to expand the historical frames and conceptual horizons of research and development around the topic of procedural literacy as a central pedagogical facet of the ludocapitalist subject. We still largely lack an institutional understanding of public procedural literacy that resists notions of universal rationality aligned with the professional technical consensus of the software industry, and that instead support the production of alternate, local procedural literacies aligned with concrete social histories. The speculative work of this chapter makes such a perspective thinkable.

I have argued in this chapter that critical procedural literacy demands more than promoting a passing familiarity with popular programming frameworks, or familiarizing a mass public with expressing oneself through a range of expedient procedural authoring tools. Contemporary forms of mass literacy are structured in relation to the democratic public spheres they sustain, so a critical concept of literacy

must grapple with the question of how its languages and media technologies maintain their representative legitimacy within the normative constraints of democratic procedural paradigms. While modern constitutional law has been studied under such a framework for quite some time, its extension to the production of public technical knowledge has been less well tested.

In contrast to comparing the harsh realities of computing platforms and programming languages up against Habermasian ideals of publicity, I have offered several generative themes that could inform a critical orientation to procedural literacy, including Deleuze and Guattari's concept of minor literature and Feenberg's concept of the ambivalence of technology. Through these lenses, I viewed the projects of DrScheme and Processing as examples of critical tactical interventions to leverage existing technology and construct new visions of what it means to code on behalf of specific literacy objectives. For Processing, a streamlined interface and programming library transformed the software-professional subject of a general-purpose programming language into the "end user" designer of interactive visualizations more concerned with simple procedural interactions than with complex object-oriented systems. For DrScheme, an incremental programming language aligned with existing educational standards combined existing math and science literacies with basic program design concepts. I take both of these projects to be representative examples of aspects of a critical procedural literacy, not only because they both provide easier and more intuitive environments for individuals to experiment with procedural expression, but because they both radically redefine the associated competencies and finished products of their subjects.

The concept of procedural literacy I have developed in this chapter is sympathetic to Berry's prediction that "Introducing democratic accountability to code may well be the democratic challenge of the twenty-first century and steering the implementation of technological artefacts will increasingly contribute to our ability

to keep our future open and democratic" (186). As long as we continue to link the notion of literacy to a deliberative ethics of human language and experience, it must be sympathetic to movements that counter, if not actively resist, the culturally and technologically normalizing forces of institutional standardization formed by global flows of systemic power. As one final instance of the latter to which this chapter is aligned, Freire has argued that a critical pedagogy involves "reading the word and the world," developing a transformative critical consciousness through which teacher and student together produce an ever-changing literacy as a practical tool for liberation and social change.[17] Instead of passively accepting the impact of industry-regulated, market-based network effects on the evolution of notations that comprise our increasingly computerized society, we can imagine a procedural literacy based on democratic principles that advocates for the construction of more public modes of software development for which their mass publics feel collectively responsible.

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[17] For a comparison of the philosophies of Freire and Habermas, see (Morrow and Torres).

Chapter 4

The Wealth of Computations: Bitcoin and Play Money

Only our limited idea of money is keeping us poor... (Boyle)

Introduction

In this chapter, I examine the enduring power and novel forms of money emerging in ludocapitalism, in particular through a critical study of Bitcoin, a decentralized virtual currency that has developed from worthless play money in 2009 into a global market capitalizing upon over 10 billion USD in exchange value by 2014. Framing the currency as an intersection of modern money grounded within a material metallism and the ethereal fictions of digital play money, I argue that Bitcoin has become the catalyst of a wide-ranging referendum on what money is, can and should be in contemporary technoculture, with a discursive significance that extends far beyond the rapidly-fluctuating prices of its particular units of currency. As such, a study of the many meanings of Bitcoin provides us with an economic reflection of the multifaceted spirit of ludocapitalism grounded in an unparalleled faith in computation, as well as

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possible avenues for critical reflection and intervention in the form of alternative economic experimentation.

4.1 Money and Modernity

The conceptual category of money, what we understand to be money and how we value, exchange, accumulate, desire and fetishize it, both reflects and shapes the organization and ideologies of the social environments structuring everyday life. In this first section, I outline how classical modern concepts of money as the universal equivalent have reflected and shaped its corresponding ideologies of democratic nation-state governance and its liberal human subject.

Marx's Money Materialism

I begin my analysis of modern money with a reading of Marx's theoretical analysis of the political-economic form of money. My claim is that this theory depends on an essentially materialist understanding of money that links the natural physical qualities and historical exchange of precious metals, particularly gold, with the social embodiment of universal value within its substance, a process that provides the necessary preconditions for capitalism to emerge. In *Capital*, Marx introduces the concept of money through an abstraction from the "material substance" of increasingly complex forms of economic exchange, the final product of which comprises "the first form of appearance of capital":

> If we abstract from the material substance of the circulation of commodities, that is, from the exchange of the various use-values, and consider only the economic forms produced by this process of circulation, we find its final result to be money: this final product of the circulation of commodities is the first form in which capital appears. . . . [W]e have no need to refer to the origin of capital in order to discover that the first form of appearance of capital is money. We can see it daily under our very eyes. (ch. 4)

As the primary representation of capital, this modern form of money forms the economic subject of classical liberalism. In contrast to economic theorists such as Ricardo from whom Marx derives many technical aspects of his economic analysis, Marx frames his Hegelian dialectic of money with an oppositional goal of critical-ironic subversion: the liberal-economic worldview comprising a "very Eden of the innate rights of man," where "There alone rule Freedom, Equality, Property and Bentham" (ch. 6) is an abstraction and extension of classical political-economic theory which Marx claims misinterprets the historical formation of the capitalist mode of production as universal laws of nature. It conceals the inequality of class struggle produced by the presumptive egalitarianism of free exchange and the free market, where the purchase of labor power and ownership of the means of production generate surplus value for the capitalist. Marx's emphasis, on the other hand, is on the historical contingency of the capitalist mode of production, its dynamism and tendencies towards overproduction, expansion and crisis.

The extreme emphasis which Marx placed on his theory of money as a material history of precious metal, in opposition to contrasting theories of money which emphasize the ideal functions of money independent of any material, is a reflection and constitutive part of this underlying emphasis and overall critical-philosophical approach. In *A Contribution to the Critique of Political Economy*, Marx includes the following complex passage on gold which emphasizes its role as both a concrete, material, physical substance and an abstract symbol of universal wealth:

> [I]n its simple metallic corporeality gold is money or money is real gold. . . . Gold is the material aspect of abstract wealth in contradistinction to commodities which only represent the independent form of exchange-value, of universal social labour and of abstract wealth. . . . [W]hereas the prices of commodities represent gold, the universal equivalent or abstract wealth, the use-value of gold represents the use-values of all commodities. Gold is, therefore, the material symbol of physical wealth. It is the "epitome of all things" (Boisguillebert), the compendium of social wealth. As regards its form, it is the direct incarnation of universal labour, and as

regards its content the quintessence of all concrete labour. It is universal wealth in an individual form. Functioning as a medium of circulation, gold suffered all manner of injuries, it was clipped and even reduced to a purely symbolical scrap of paper. Its golden splendour is restored when it serves as money. The servant becomes the master. The mere underling becomes the god of commodities. (ch. 2.3)

In this passage, which I read as a concise summary of Marx's statement on the function of precious metal in his theory of money, I note two key insights condensed into the "simple metallic corporeality" of gold as the material embodiment of abstract wealth. First, the "direct incarnation of universal labour" is attributed to the metal as a representation of the generally stable but fluctuating labour necessary to mine and process gold from a natural element of the earth's crust into a valuable commodity.[1] Second, the Hegelian allusions at the end point to Marx's dialectical claim that gold historically emerged as a "universal equivalent" due to its natural material properties that made it most suitable as a generalized medium of exchange, but as a result is now being sublimated into its own symbol, replaced in practice by debased coins and "worthless" tokens of representative value issued by national governments.[2]

Marx's dialectical approach to understanding of the significance of the symbolic representation of wealth in the form of debased coins and paper money is a crucial, often misunderstood element of his material theory of money, and a key point of contention among opposing theories still current in mainstream economic thought

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[1] Compare to a similar passage from *Capital*: "These objects, gold and silver, just as they come out of the bowels of the earth, are forthwith the direct incarnation of all human labour. Hence the magic of money" (ch. 2.).

[2] Marx articulates this dialectic in greater detail in an earlier section of the same text: "In the same way as the exchange-value of commodities is crystallised into gold money as a result of exchange, so gold money in circulation is sublimated into its own symbol, first in the shape of worn gold coin, then in the shape of subsidiary metal coin, and finally in the shape of worthless counters, scraps of paper, mere tokens of value. But the gold coin gave rise first to metallic and then to paper substitutes only because it continued to function as a coin despite the loss of metal it incurred. It circulated not because it was worn, but it was worn to a symbol because it continued to circulate. Only in so far as in the process of circulation gold currency becomes a mere token of its own value can mere tokens of value be substituted for it" (*A Contribution to the Critique of Political Economy* ch. 2.2.c).

today. In order to draw out the significance of Marx's emphasis on gold as the material aspect of abstract wealth, I will next examine the general argument of Knapp's contrasting state theory of money, which I position as an idealism alongside Marx's materialism that together circumscribe the classical liberal-humanist discourse of modern money.

Metallism and Cartalism

A broad group of early twentieth-century economic theorists including Knapp, Keynes and Schumpeter have characterized an emphasis on precious metals as the foundation of money such as Marx's theory exhibits as reflecting an outdated "metallism." Against this view, they offer the concept of "c[h]artalism,"[3] a modern, juridical ideal of money conceived as the distribution and management of abstract quantities of state-administered debt. The concept originates in Georg Knapp's *The State Theory of Money*, and although I believe that Knapp's original metallism/cartalism distinction risks reductively denouncing the material significance of precious metal in favor of government-issued paper currency as the exemplary ideal of modern money, I also find its legal-historical theory of money to be a good point of reference for identifying the intersection of economic exchange and nation-state organization within classical liberal economic theory.

With his stated purpose to "replace the metallistic view by one founded on Political Science" (viii), Knapp begins his book with a fundamental juridical thesis: "Money is a creature of law. A theory of money must therefore deal with legal history" (1): "Through its Courts of Law the State gives a right of action for debt" (11). However, "Historical experience" reveals that rather than maintain debts in terms of a

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[3] Although Knapp originally coined the concept with the spelling "Chartal," it is often spelled "cartal" in the subsequent economics literature so I adopt this latter spelling except when quoting Knapp directly.

specific quantity of material, "The State always maintains only the relative amount of debts, while it alters the means of payment from time to time" (13), suggesting a position where the State "meant only the name of the former unit without attaching any importance to the material of which it was imposed" (14–5). Knapp calls such abstract, material-independent debts accounted by State "'nominal' debts" (15), arguing that this forms a necessary precondition for the modern concept of money: "The nominality of debts and of the unit of value is a necessary premise before money can come into being" (19); "So long as a given material is *per se* a means of payment, money has not yet come into being" (25–6). He next supplements nominal debts with the concept of "morphic means of payment," a second necessary condition for a system of money where "Our law lays it down that only pieces formed in such and such a manner are to be admitted as means of payment" (27). The result is a "Chartalist" theory of money that denies any significance of metal in its ideal form:

> [T]here is nothing to prevent us from giving to the morphic means of payment a validity dependent not on weight but on fiat. . . . The validity can depend on proclamation. . . . [W]e need another short name for "morphic proclamatory" means of payment, the metallic contents of which are of no importance for validity. At least they are movable objects which have in law a significance independent of their substance. . . . Perhaps the Latin word "Charta" can bear the sense of ticket or token. . . . Our means of payment have this token, or Chartal, form. (30–2)

Schumpeter, who harbored a sustained, skeptical interest in Marx's economic analysis, labeled Marx the quintessential metallist. Though Schumpeter himself characterized the basis of Knapp's non-metallist theory as an "absurd claim" that was "in almost complete ignorance of both the literature and the logic of the subject" (1057), he nonetheless adopted and extended Knapp's terminology to include "theoretical" and "practical" subcategories of metallism and cartalism, which he used to classify the positions of economic analysts according to their theories of money:

By Theoretical Metallism we denote the theory that it is logically essential for money to consist of, or to be "covered" by, some commodity so that the logical source of the exchange value or purchasing power of money is the exchange value or purchasing power of that commodity, considered independently of its monetary role. . . .

By Practical Metallism we shall denote sponsorship of a principle of monetary policy, namely, the principle that the monetary unit "should" be kept firmly linked to, and freely interchangeable with, a given quantity of some commodity. Theoretical and Practical Cartalism may best be defined by the corresponding negatives. (274–5)

Schumpeter finds theoretical metallism common in the century after Smith, and "by nobody more implicitly than by Marx" (276). Schumpeter takes "for granted that theoretical metallism is untenable," as it relies upon "a confusion between the historical origin of money, . . . and its nature or logic—which is entirely independent of the commodity character of its material" (276). As I noted above, however, Marx in fact articulates this connection between the historical origin of money and its nature not as a confusion, but as an explicitly dialectical movement essential to the development of its modern logic. For this reason, I characterize metallism as a materialism, contrasted against the idealism of cartalism.

To the extent that proponents of cartalism rest on the essential premise that "modern money is state money" (Tcherneva 77), Marx's metallism can be interpreted not just as a practical revolutionary resistance to state-controlled economic policy, but also as a theoretical concept of modern money that looks beyond the nation-state's juridical ordering of money as authorized means of debt payment. By asserting a material history of money in relation to the broader social totality of a global capitalism not restricted to the confines of official state policy, Marx's metallism is perhaps most significant and relevant at the margins of governmental order, where trust in the stability and security of the nation-state falters in periods of political-economic crisis or revolution. Marx's theory of money maintains its

distance from the internal dynamics of state-led finance, as he carefully distinguishes an "internal sphere of circulation of commodities, which is circumscribed by the boundaries of a given community and separated from the universal circulation of the world of commodities" (*A Contribution to the Critique of Political Economy* ch. 2.2.c).

Toward Postmodern Money

As Marx points toward in this concept of the universal "world of commodities" juxtaposed against the state's internal sphere, globalization has become a crucial general category in the transition from industrial capitalism to the landscape of multinational corporations characteristic of ludocapitalism. In addition to globalization, I will next touch upon two additional theoretical lines of departure leading from the classical modern monetary theories of metallism and cartalism into an analysis of money within ludocapitalism. These aspects are that of formalization and spiritualization, which I derive primarily from the work of Simmel.

First, I wish to further distinguish formalization in terms of its ideal and material elements, etherealization and rationalization. Ideal formalization describes a progressive abstraction or removal from physical embodiment, an abstraction I thematize as *etherealization* following McLuhan's use of the term. Here, the cartalist paradigm of paper-based money containing value backed by the legal force of a stable and powerful government serves as the backdrop, through which the material of money becomes increasingly insignificant compared to its ideal, symbolic form. As global financial institutions and information and communications technology have continued to grow increasingly sophisticated and powerful, even the "worthless" paper form of money has steadily dissolved into increasingly ethereal forms of monetary payments such as credit card and, more recently, mobile phone and Internet-based money transfer systems.

Simmel noted this progression in , describing a "persistent trend towards the transformation of money into a purely symbolic representative of its essential function" (191), a trend that would only intensify throughout the twentieth century. In his characteristic tone of breathless prophecy, McLuhan cited such a transformative etherealization of physical money as a corollary to the transcendence of Marxian labor-value by the "movement of information": "As work is replaced by the sheer movement of information, money as a store of work merges with the informational forms of credit and credit card. From coin to paper currency, and from currency to credit card there is a steady progression toward commercial exchange as the movement of information itself" (137). Such a "steady progression" towards an ideal money of pure information flow extends the cartalist ideal of a legal regime of printed money into its information-age equivalent. However, the process by which the universal labor-value constitutive of material money transitions into its digital equivalent is here left untouched, as credit card balances or bank account statements are only new symbolic representations of value, not its material embodiment: even in digital form, a contract for an ounce of gold's worth of money is equivalent in value to a real ounce of gold insofar as the debtor is trustworthy and the contract is upheld by the State's "right of action for debt," to refer back to Knapp's original cartalism.

Simmel's concept of formalization also incorporates a critical account of rationalization, eventually leading to some promising revisions to Marx's metallist position as well as a critique of the ideal juridical thesis of reified state power. Extending Marx's theory of commodity fetishism in which a social relation between people appears within the commodity as a material relation between things, Simmel suggests that the increasing penetration of market-based exchange into everyday life tends toward a modernity in which quality is replaced by quantity and subjective social relation replaced by objective value, producing the formalized basis of a rational style of life:

> This measuring, weighing and calculating exactness of modern times, . . . seems to me to stand in a close causal relationship to the money economy, . . . [which] enforces the necessity of continuous mathematical operations in our daily transactions. The lives of many people are absorbed by such evaluating, weighing, calculating and reducing of qualitative values to quantitative ones. . . . Money expresses, . . . the purely commercial element in the commercial treatment of things, just as logic represents comprehensibility with reference to comprehensible objects. Since the abstract form that represents the immanent value of objects takes the form of arithmetical precision and thus of unequivocal rational accuracy, its characteristics must reflect upon the objects themselves. (448–50)

Second, alongside this critique of modern intellectuality produced by the money economy, Simmel offers an alternative theory of value derived from an aesthetic concept of subjective distance which I call a *spiritualization* of money. Here, the tone is hopeful rather than tragic, and hinges upon a methodological opposition to Marx's historical materialism that Simmel outlines in his preface to the second edition of his book:

> The attempt is made to construct a new storey beneath historical materialism such that the explanatory value of the incorporation of economic life into the causes of intellectual culture is preserved, while these economic forms themselves are recognized as the result of more profound valuations and currents of psychological or even metaphysical preconditions.[4] (54)

In opposition to Marx's theory of value as universal labour power, Simmel offers a broader account of the forms of social relations that produce value, an argument he frames as replacing the economic concept of use-value or "utility" by a "desire for the object" (88):

> The idea, . . . that the essential feature of value is the socially necessary labour time objectified in it, . . . does not answer the question of how labour power

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[4] Notably, in a published self-advertisement for his own book Simmel used the term *spirit* [Geist] to describe these currents: "I extend the claim of historical materialism, which allows all forms and contents of culture to emerge out of the prevailing economic relations, by evidence that the economic valuation and movements are, for their part, the expression of more deeply lying currents of individual and societal spirit [Geist]" (qtd. in Frisby 526).

itself became a value. . . . According to this theory, if price and value diverge, one contracting party exchanges a quantity of objectified labour power against a smaller quantity; but this exchange is affected by other circumstances which do not involve labour power, such as the need to satisfy urgent wants, whims, fraud, monopoly, etc., . . . it is always the interrelation of demands, realized in exchange, that gives economic value to objects. (93–4)

Simmel therefore suggests a "profound relationship between relativity and socialization" (99), arguing that "economic value, . . . resides exclusively in the reciprocal relationship arising between several objects on the basis of their nature" (99), a worldview that he theorizes in neo-Kantian fashion terms as the "relativity of truth" (114). In this way, Simmel collapses the distinction between metallic money and credit, and by extension metallist and cartalist theories of money, into a unified theory of intersubjective exchange, or "the common relationship that the owner of money and the seller have to a social group—the claim of the former to a service and the trust of the latter that this claim will be honoured" (177). Finally, an additional element based in faith and belief in the religious sense gives this theory of money a distinctively spiritual element:

> [I]n the case of credit, of trust in someone, there is an additional element which is hard to describe: it is most clearly embodied in religious faith. When someone says that he believes in God, [it expresses] a state of mind which has nothing to do with knowledge, which is both less and more than knowledge. . . . Economic credit does contain an element of this supratheoretical belief, and so does the confidence that the community will assure the validity of the tokens for which we have exchanged the products of our labour in an exchange against material goods. [It] contains a further element of social-psychological quasireligious faith. The feeling of personal security that the possession of money gives is perhaps the most concentrated and pointed form and manifestation of confidence in the socio-political organization and order. The subjectivity of this process is, so to speak, a higher power of the subjectivity that creates the value of precious metals in the first place. (178)

Simmel here assimilates both precious metal and credit money into a sociological theory of money as based on the relativity of truth within an exchanging community's collective trust informed by faith in its socio-political organization.

This theory of modern money as the representation in "congealed form" (175) of an intersubjective spirit, combined with a critical view of the objectivity of monetary exchange producing a style of life that emphasizes formal calculation and rationalization, gestures beyond the categories of modern money established by classical political economists and their critics, arguably anticipating Weber's thesis on the spirit of capitalism.[5] It also provides a basis for understanding and critiquing the changing role of money within ludocapitalism, including the understanding of economic exchange in terms of game theory and the corresponding legitimation of forms of "play money," which I turn to in the next section.

4.2   Play Money

In this section, I shift from theories of money in classical liberal political economic theory to the development of economic thought in relation to digital environments, particularly geographically-distributed economic communities connected through the Internet. In the second half of the twentieth century, the decline of nation-state economic sovereignty and the rise of multinational corporate power precipitated a paradigmatic shift in institutional organization from a society based on centralized, disciplinary power to a society based on decentralized systems of control, a correlation

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[5] Although Weber was somewhat critical of Simmel's work, (Appadurai)'s close reading of Weber outlined in "The Spirit of Calculation" suggests similar themes, especially contrasted against mainstream (neoclassical) economic thought. Inspired by Weber, Appadurai wants to "return to the idea of the 'spirit' of capitalism" (7) in his contemporary project of a social study of finance, asking "what the link between 'spirit' and 'ethic' might be today" (8). Noting Weber's unique concept of "magicality," Apparudai observes: "Today, . . . it is possible to identify a series of magical practices, . . . at the heart of global capitalism, and in particular, of the financial sectors. These practices are premised on a general, absolute and apparently transcendent faith in the market" (8–9).

that Deleuze explicitly identified in relation to contemporary shifts in national monetary policy:

> Money, perhaps, best expresses the difference between the two kinds of society, since discipline was always related to molded currencies containing gold as a numerical standard, whereas control is based on floating exchange rates, modulations depending on a code setting sample percentages for various currencies. (180)

As a corollary and contribution to this transitional narrative of money, I offer the concept of *play money* as encompassing the forms and tensions of money within ludocapitalism. To illustrate this concept, I will begin with an account of play money within digital labor economies that spontaneously developed in virtual worlds in the early 2000s, followed by an in-depth case study of Bitcoin as a recent paradigm of money that I argue reflects the spirit of ludocapitalism more generally.

Play Money

The historical usage of the term "play money" itself reflects the ambiguity within the concept of game-playing that I discussed in the first chapter. Historically, it often referred to money allocated for or obtained from "play" in the sense of gambling or gaming.[6] Other times, it refers to money that is not materially "real" in some subjective sense of stability or value, such as an expired bank note or a government-issued currency that has been devalued by inflation, as contrasted against a precious metal such as gold.[7] Finally, in contemporary usage the term most often refers to fictional or symbolic money intentionally designed to have minimal exchange

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[6] For example, in a British comedy from 1705: "Play-Money, . . . amongst People of Quality, is a sacred Thing, and not to be profan'd. The deux—'tis consecrated to their Pleasures, 'twould be Sacrilege to pay their Debts with it" (Vanbrugh).

[7] For example, in an 1896 pamphlet defending the gold standard, an American railway authority related an anecdote about a box containing paper bills issued by various American banks around 1860, discovered twenty years later after they no longer held value: "All this was at one time thought to be real instead of play money" (Kirkman 9).

value outside the magic circle of a game, such as the colorful paper bills used in a game of Monopoly.

In contemporary technoculture, play money in all three of these senses is confronted and complicated by the incorporation of game-playing into capitalism. First, as modern economic theory since game theory of von Neumann and Morgenstern has adopted models of strategic action, risk and competition through analogy to traditional gambling games, the once-clear distinction between play money earned through gambling and other earnings from strategic investment or speculation in other forms of game-like economic systems is eroding. Second (as Deleuze related in the quote above), following the collapse of the Bretton Woods system of international financial exchange in 1971, the world's most widely traded currencies are no longer linked together by fixed exchange rates negotiated in the political arena and convertible to gold. These fluctuating valuations, in addition to gold itself, are now all equally subject to currency speculation and the risk of being devalued into worthless play money. Finally, Internet-based virtual currencies have emerged that, while originating within their digital environments as purely fictional play money, nonetheless often develop observable real-world exchange rates.

Conversely, the forms of play money that arise within virtual worlds retain traces of all three senses of the term: its value is obtained from game-like conditions; their exchange values are subject to high amounts of speculation; and they are founded upon purely symbolic fictions with no previous substance or state authority grounding or backing their value. Next, I will examine the discourse of play money as it has been theorized within several academic discussions of virtual worlds, uncovering the seeds of an economic theory of ludocapitalism ambivalently linked to the modern theories of money discussed in the first section.

Ludocapitalism in Virtual Worlds

Since Edward Castronova's widely-cited 2001 paper on the economics of virtual worlds, academic game studies researchers have taken a keen interest in the structured economies found in commercial multiplayer computer games. Castronova's paper, subtitled "A First-Hand Account of Market and Society on the Cyberian Frontier," exudes enthusiasm for virtual worlds representative of the extropian genre of techno-futurist euphoria: "To a large and growing number of people, virtual worlds are an important source of material and emotional well-being. Virtual worlds may also be the future of commerce, and perhaps of the internet itself" (3); "VWs [virtual worlds] may soon become one of the most important forums for human interaction, on a level with telephones. Moreover, in that role, they may induce widespread changes in the organization of Earth society" (37). The numerical analysis proposed by Castronova is the earliest attempt to quantify the labor market in a multiplayer commercial computer game from a basic economic perspective in terms of labor value and exchange rates. Through a survey administered to over three thousand Everquest players, including questions about the total value of all in-game virtual property and total number of avatar hours, Castronova calculated that the average avatar accumulated virtual net worth at a rate of 319 platinum pieces per hour, or $3.42 US dollars per hour at the exchange rates found on second-hand virtual currency markets.

Following Castronova's provocative surveys, tech journalist Julian Dibbell published a blog-turned-book, *Play Money*, recording his public attempt to act as a full-time virtual entrepreneur in Ultima Online for a full year in 2003-2004, harvesting and trading virtual resources in exchange for national currency through eBay auction sales. Dibbell's project not only coins the term ludocapitalism, but also suggests the basis of an economic theory founded upon the economics of virtual currency and digital labor. His argument is tentative and ambiguous, but marks a

crucial moment in a critical understanding of play money within ludocapitalism that I will expand upon through a close reading.

In the process of making (and paying taxes on) over 11 thousand dollars in profit over the course of his experiment, Dibbell was fascinated by players he encountered who would routinely spend hard-earned US dollars on secondary virtual goods markets, in exchange for virtual property and fictional gold to boost their avatars. He was equally interested in the vocational intensity of players toiling away in virtual farms and dungeons to produce the coveted items of status and power. Considering the famous "iron cage" metaphor of freedom-constraining rationalism in Weber's account of early twentieth-century industrial capitalism becoming increasingly divorced from its ascetic, Protestant origins, Dibbell asks, "If this iron cage was founded largely on an exaltation of work as everything that play is not—productive, rational, efficient—might we not find our way out of it in a countervailing exaltation of play?" (62).

Here, Dibbell both assumes and questions the Protestant ideals of play as the inverse of its work ethic.[8] He finds his answer in Weber's brief comments on the American state of play at the start of the twentieth century: "In the field of its highest development, in the United States, the pursuit of wealth, stripped of its religious and ethical meaning, tends to become associated with purely mundane passions, which often actually give it the character of sport" (qtd. in Dibbell 298). Deriving some hesitation from this dismissive attitude toward American proto-ludocapitalism, Dibbell backed away from an unqualified exaltation of play as freedom from Weber's iron cage of rationality. In his final analysis, he began to view the kind of activity

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[8] It is worth noting that this work ethic was not merely confined to personal moral opinion, but within the United States it extended throughout the legal institutions of the colonies through prohibitions on gaming. The language introducing a 1762 South Carolina "Act for the better preventing of excessive and deceitful gaming," for example, is common: "WHEREAS games and exercise should not be otherways used than as innocent and moderate recreations, and not as constant trades or callings to gain a living or make unlawful advantage thereby" ("An Act For the Better Preventing of Excessive and Deceitful Gaming" 158).

taking place within virtual worlds as a contrived meaning, a saccharine layer of entertainment fiction built on top of an inescapable economic system binding the individual to wage labor:

> Drained of the religious significance that gave it meaning, the economic system we inhabit must either bind us to its pointlessness against our wills, . . . or contrive new meanings for our daily grind. And what easier way is there of contriving meaningful activity than through the mechanisms of play? Add computers to the historical picture, effectively building those mechanisms into the technological foundation of the world economy, and the contriving gets so easy that it starts to look inevitable. The grind must sooner or later become a game. Call it a theory of ludocapitalism, and don't feel too obliged to take it seriously. (298–9)

Dibbell's economic theory of ludocapitalism here contemplates the ludification of work with some much-needed ambivalence. He recognizes that the virtual world economies represent how the modern work economy is evolving to incorporate "mechanisms of play" into the structure of its "grind," its capitalist mode of production and accumulation, suggesting that the process is irreversible or "inevitable." If the separation between work and play is itself a contrived, ascetic remnant of industrial capitalism fueled by the Protestant faith, then this separation is gradually unraveling in a secular transformation into contemporary ludocapitalism where "the grind was already escaping from itself" (299).

Dibbell's relation to Weber's condemnation of American proto-ludocapitalism is therefore somewhat conflicted. Weber lamented that the wealth-seeking sport of American proto-ludocapitalism was "stripped of its religious and ethical meaning," more of a von Neumannian game-theoretic situation avant la lettre than a Schillerian liberal-humanist play. On the one hand, Dibbell's theory of ludocapitalism welcomes "meaningful activity" produced by play inevitably becoming incorporated into the capitalist system of production. On the other hand, rather than enthusiastically embrace the productive capacity of play-fueled virtual economies, Dibbell also suggests that his year-long experience in virtual entrepreneurship did not produce the

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utopian transformation of work into an exaltation of play that he had longed for: his theory of ludocapitalism was "the closest I can come to saying why it was I left the business when I did" (299).

Dibbell's ambivalence can be summarized as follows: although the discovery and analysis of virtual economies revealed significant and compelling phenomena representative of post-industrial labor, the mere presence of productively-valued output within game-like spaces, or of game-like autonomy within productive spaces, does not guarantee more meaningful work or even freedom from exploitation. On the contrary, the removal of traditional boundaries between work and play, and the liquidation of play money into global ludocapital, have produced not only new forms of production but also new forms of global exploitation. For a more recent example, in *Games of Empire*, Dyer-Witheford and de Peuter document the complex, contradictory intersections of forces of global biopower apparent in the commercial gold-farming operations prevalent in Blizzard's World of Warcraft game:

> Gold-farming operations, . . . have their own deeply exploitative work disciplines: behind the hunter or rogue looting gold in Azeroth, there is a player who, while he or she reappropriates value from Blizzard, is her- or himself expropriated of that value by cyber-sweatshop operators and RMT [real-money trading] brokers. This workforce, . . . is recruited from those dispossessed by the primitive accumulation proceeding around Guangzhou, Shanghai, and Beijing—a primitive accumulation that is itself, in a bizarre circularity, partly driven by China's new position as the global center of computer production and commercial Internet activity, including MMO [massively multiplayer online] play. (149)

Unquestionably opposed to any uncritical exaltation of play, Dyer-Witheford and de Peuter argue that "the controversy over gold farming displays the dystopian realities of social existence so saturated by commodification that it is impossible to escape even in play" (150), a demonstration of "how powerfully games have been subsumed by capital" (151). With appropriately fungible secondary markets in place, mining gold

in a virtual world is no more sacred, inherently meaningful, or resistant to global capitalist exploitation than any other activity of human labor.

4.3   Bitcoin

The economies of digital labor produced in Everquest, Ultima Online and World of Warcraft discussed above illustrate the contemporary phenomenon of real-world value spontaneously generated from within the rule-based constraints of digital game environments. These examples all lend support to the etherealization thesis discussed in the first section, since the virtual gold within these game-worlds is no longer physical material but merely digital quantities of transferable power within the online game environment. Considering these virtual worlds are designed, authored and owned by digital game companies and all of their virtual properties technologically monitored and enforced by centralized servers, they are corporate equivalents of money issued and controlled by the state, representing a ludocapitalist equivalent of the cartalist ideal of money.

In this section, I consider the case of Bitcoin[9] and its diaspora of alternative "crypto-currencies" as a more recent class of decentralized virtual currency systems that represents a ludocapitalist paradigm of money that relates to, yet transcends, the endogenous economies of virtual worlds. I develop a reading of Bitcoin as a paradigmatic expression of the contemporary "spirit" of ludocapitalism, which

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[9] A note on capitalization: I have chosen to follow the convention of distinguishing between "Bitcoin" when referring to the decentralized network or project as a specific entity, and "bitcoin" when referring to a general unit or quantity of virtual currency. This convention is itself contested, and my choice reflects claims I make in this chapter. A writer for the Wall Street Journal rationalized his editors' decision to adopt a lowercase convention by arguing that "Bitcoin is not a single, specific Thing. . . . [It] is a multi-faceted, dispersed, decentralized thing. It is everywhere, under no single entity's control, like computers and cars and books" (Vigna). My position in this chapter is that despite the decentralized diffusion of bitcoins, Bitcoin as a software project and network of payments is nonetheless still a concrete Thing that is subject to identifiable forms of protocol-oriented control, influence and critical analysis.

involves a transcendent faith in pure, global computation subverting a transcendent faith in a market conventionally conceived as a political-economic network of global financial institutions.

In many ways, the emerging landscape of Bitcoin and associated crypto-currencies is comparable to the capital flows of the virtual economies that preceded its creation. First, both economies depend on a system that allows for the production of objects embodying relatively durable forms of "congealed labor time," to use Marx's term, and a mechanism for secure exchange across the Internet. In comparison to an economy such as Ultima Online that revolves around the exchange of in-game fictional "gold" and other virtual property that demands estimable quantities of in-game human labor time to accumulate, Bitcoin's economy revolves around the production and exchange of "proof-of-work" tokens representing verifiable amounts of computational effort and expense.

I find the best way to illustrate the distinction between Bitcoin and virtual currency is by way of a comment about Bitcoin by the original authority on virtual economies. In 2011, Castronova published a blog post on why he is "skeptical about Bitcoin" in contrast to his sustained enthusiasm for virtual world economies: his main concern centers on the proof-of-work creation algorithm at the heart of Bitcoin's economy:

> Whatever the actual process, [proof-of-work] is not "meaningful work" in the sense of the real world or video games. Technically, yes: It is an operation that consumes resources and results in a proof of work. But it doesn't contribute anything in a human sense to the universe. . . . Meaningful work is work that an ordinary human being could view as part of some quest or achievement or contribution. (Castronova, "Bitcoin")

Rather than explaining why Bitcoin's economy values less "meaningful work" than the quest or achievement-oriented forms of play-labor taking place within online game economies, however, I think that Castronova's comment instead reveals a deeper,

more substantial ludocapitalist spirit at the heart of the Bitcoin economy: a collective belief, often times approximating spiritual faith, in cryptographic computing power as the most meaningful work possible in contemporary technoculture. In this sense, an interpretation of Bitcoin as play money can be viewed as an antithesis or critique of fantasy game economies in which production involves laborious tasks linked to mundane, repetitive human interactions cloaked in fantastic metaphors of combat, exploration, natural resource mining or material craftsmanship (its "grind" in Dibbell's parlance). As such a critique, Bitcoin runs parallel to Progress Quest, a satire of EverQuest's fantasy roleplaying simulation of wealth accumulation that replaces the grind of human interaction with a progress bar (Fredricksen). Instead of human button-clicking comprising the bulk of labor-creating wealth producing resources, inventory, and experience points, Progress Quest avatars continuously amass points, wealth and power without any human interaction at all, as the autonomous, timed advancement of a fluctuating progress bar results in one's avatar killing monsters, completing quests, and accumulating wealth and power in the game world.

I find the global adoption of decentralized currency Bitcoin to be a critical juncture in the history of money not because it fits easily within a progression towards an ideal nexus of pure information-commodity exchange, but because it establishes a new discourse of wealth built around a transcendent spirit of computation as a new organizing force in economic governance. In this section, I will interrogate the underlying materiality of this claim, one which is largely founded on a strong metallist analogy to gold yet in other ways is also unique to ludocapitalism, through an exploration of the various perspectives through which the Bitcoin economy is understood and valued by its participants. As neither a precious metal extracted from the earth nor a symbolic token of credit backed by the state, the various elements that contribute to Bitcoin's transubstantiation from play money into legitimate, valuable

currency is a reflection of the contemporary spirit of ludocapitalism upheld in the collective belief of its faithful followers.

The remainder of my discussion of Bitcoin will proceed as follows:

First, I will discuss the mythical, pseudonymous foundation of Bitcoin, arguing that its technocultural origins in libertarian and cypherpunk ideology are not merely coincidental but comprise an essential meta-narrative grounding the currency's spiritual legitimacy.

Second, I will examine the "digital metallism" grounding the protocol outlined in the original Bitcoin white paper within a materialism strikingly analogous to Marx's analysis of gold in his labor theory of value. Following this, I explore the multivalent identity of Bitcoin along various hermeneutic perspectives: as a technical software project, political ideology, speculative fiction, authored text, financial asset and investment vehicle. Bitcoin cuts across all of these identifications and disciplinary boundaries, finding a material basis in what Galloway describes as a "physical logic" of protocol.

Finally, looking beyond Bitcoin economy itself to its initiation of a Foucauldian discursive practice, I read its diaspora of alternative crypto-currencies as a new, sustained method of experimental economic discourse. Although the vast number of "altcoins" largely evoke similar protocological materialities as Bitcoin, the sustained existence of such alternatives and their communities demonstrate, contra Galloway, that the material force of protocol can be critiqued and transformed through discursive means other than hypertrophic exploits of the protocol itself, encouraging us to read political and social aspects of the assumed materiality within protocol designs.

Satoshi's Performance of Identity

The Bitcoin project made its public debut on October 31, 2008, when a message was posted to The Cryptography and Cryptography Policy Mailing List from "Satoshi Nakamoto (satoshi@vistomail.com)," titled "Bitcoin P2P e-cash paper." The message begins, "I've been working on a new electronic cash system that's fully peer-to-peer, with no trusted third party," followed by an abstract of a technical white paper on the Bitcoin system architecture, and a URL link to the full paper hosted at bitcoin.org (Nakamoto, "Bitcoin P2P E-Cash Paper").

Like many other Halloween costumes on parade that evening, Satoshi Nakamoto was a pseudonym, specifically crafted to present the Bitcoin system to the public behind a digital veil of secrecy. Satoshi's vistomail.com e-mail address and bitcoin.org domain registration were both established through AnonymousSpeech.com, a secure anonymous e-mail and domain hosting company based in Tokyo. With the entirety of Satoshi's communication routed through this anonymity provider, the origin of all communication associated with the identity to date remains a mystery. Despite several public investigative attempts to unmask the real person(s) behind the Satoshi name, only traces of inconclusive, circumstantial evidence have been found, and all potential suspects have publicly denied any connection to the identity.[10]

However ghost-like the phantom identity of Satoshi appeared to those seeking to find the person or people behind the digital mask, the author nonetheless maintained a commanding, unifying virtual presence within the growing Bitcoin community for over two years. During that time, Satoshi closely managed Bitcoin's development, responding to mailing list and forum discussions, published periodic updates and bug fixes to the Bitcoin code repository, and collaborated with other early

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[10] Satoshi's enduring pseudonymity has attracted considerable commentary and speculation (Davis; Penenberg; Grey; Peterson; Goodman).

contributors through IRC and email. Satoshi's public communication abruptly halted weeks after WikiLeaks' momentous publication of the United States diplomatic cables in December 2010. After a range of payment processors including Visa, MasterCard, PayPal, Bank of America and Western Union all blocked WikiLeaks from receiving donations through their payment systems due to political pressure, some Bitcoin forum members started clamoring for WikiLeaks to accept Bitcoin. Satoshi disagreed, arguing that the Bitcoin network was still too young to handle such a public political stage. After an article in PC World profiling Bitcoin in the context of the WikiLeaks scandal, Satoshi wrote ominously, "WikiLeaks has kicked the hornet's nest, and the swarm is headed towards us," making his last public communication less than a day later (Nakamoto, "Re: PC World Article on Bitcoin"; see also Wallace).

In light of this founding narrative, I view Bitcoin as a particularly self-referential performance of pseudonymous identity, one that is essential to the network's spiritual legitimacy. Insofar as the preservation of liberty through technological pseudonymity is one of the project's core ideological values, I imagine Satoshi as the network's image of authenticity, its archetypal subject or Weberian "charismatic authority." Such a subject may be less recognizable as an author accorded to traditional forms of media, but more endemic to the kind of selectively-public, digitally-mediated social relations the Bitcoin project imagines. The lasting reverberations of Satoshi's presence extend far beyond the authorship and original stewardship of the Bitcoin project, as his mysterious, untraceable identity has become an enduring foundation myth that has helped fuel further popular interest in the network. As a public performance of digital anonymity, the legend of Satoshi benevolently establishing the Bitcoin network and then vanishing without a trace has only added to the hacker-mystique narrative that sparked public media interest and contributed to its broad adoption.

Related to this identity performance, I understand Bitcoin as a political movement and ideological statement. The motivating premise behind Bitcoin's

decentralized, peer-to-peer architecture is that a global, networked computing infrastructure makes for a more reliable, efficient and trustworthy monetary system than the existing network of international financial institutions. This ideal of money autonomously administered through an impartial Internet protocol meshes well with the libertarian ideal of disestablishing existing financial institutions that subordinate the abstract freedom of market exchange to specific political, national, or self-serving interests. In this vein, Bitcoin has been ideologically aligned with libertarians, crypto-anarchists and other similar groups whose politics advocate shifts in power away from existing nation-state institutional regimes toward distributed, computer-mediated systems of authority and exchange.

Digital Metallism

I read the economic structure of Bitcoin's protocol outlined within Satoshi's original white paper as strongly advocating a form of what Maurer et al. have termed "digital metallism," grounded in a practical materialism running parallel to Marx's analysis of gold in his labor theory of value and commodity theory of money:

> The digital metallism of Bitcoin echoes the materialism of commodity theories of money, such as those championed by Locke, the bullionists of the nineteenth-century, and the gold-standard supporters of today. And, as with Locke, this metallism is also part of a broader materialism linked to an ideology that emphasizes individual liberty and sees "sound" money as a key component of that liberty, as well as a key site for potential government intrusion. (Maurer, Nelms, and Swartz 13)

The digital maxim at the material center of the Bitcoin protocol is the cryptographic concept of "proof of work," which Satoshi describes in his white paper with a political inflection as "one-CPU-one-vote" ("Bitcoin" 3). Such a rule makes computational might the only form of power given voice within the economic community, granting physical computer hardware a privileged status in the emerging discourse.

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Cryptographic proof of work thus imagines the number-crunching machine as the ultimate equalizer of digital society, efficiently flattening an unprecedented deluge of voices into quantitative economic values according to a simple collective game of computational strength. In this way, Bitcoin replaces (but preserves through metaphor) Marx's concept of human labor in the form of mining physical gold as the universal equivalent of value with computational labor in the form of "mining" digital blocks of bitcoins.

By specifying a controlled competition for newly minted coins within the protocol, Satoshi's Bitcoin design also added a crucial psychological element to the recipe for money that previous crypto-currencies had not yet perfected: market competition, or greed. Best represented by premodern alchemy in the form of the philosophers' stone, it is the element of greed, the human desire for accumulating objectified, external power over nature and social relations, that explains money's supernatural power over the individual, as Marx demonstrates through an alchemical analogy in the *Grundrisse*:

> From its servile role, in which [money] appears as mere medium of circulation it suddenly changes into the lord and god of the world of commodities. . . . It is exactly as if, for example, the chance discovery of a stone gave me mastery over all the sciences, regardless of my individuality. The possession of money places me in exactly the same relationship towards wealth (social) as the philosophers' stone would towards the sciences.
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> Money is therefore not only *an* object, but is *the* object of greed. It is essentially *auri sacra fames* [accursed hunger for gold]. (221–2)

Marx concludes that "Monetary greed, or mania for wealth, necessarily brings with it the decline and fall of the ancient communities" (223), an analysis precipitating his prediction of the inevitable decline and fall of the modern capitalist system. Pursued further, however, the alchemical analogy also reveals the limits of such essential claims. Although Marx states that "Money as individualized exchange value and hence as wealth incarnate was what the alchemists sought" (225), Karen Pinkus observes in her

literary history of alchemy that the alchemical tradition was in fact more ambivalent: "Greed is precisely what is disavowed by those more 'spiritual' or philosophical forms of alchemy, and the typical early modern alchemical treatise includes disclaimers against the use of precious metals on the market. Even if the alchemist tried to exchange his product for commodities, he would not succeed. So greed must be considered crucial to alchemy, even when—or especially when—it is denied" (10).

Similarly, the pursuit of wealth within capitalism is more ambivalent, as Weber's analysis of *auri sacra fames* in *The Protestant Ethic* attests: Although "the auri sacra fames is as old as the history of man, . . . those who submitted to it without reserve as an uncontrolled impulse were by no means the representatives of that attitude of mind from which the specifically modern capitalistic spirit as a mass phenomenon is derived, and that is what matters" (ch. 2). His argument is that greed alone is neither a unique cause nor a sufficient explanation of modern capitalism, but rather that "the rational utilization of capital in a permanent enterprise and the rational capitalistic organization of labor" had "become dominant forces in the determination of economic activity." According to Weber, the spirit of capitalism does not necessarily encourage greed to run rampant and disintegrate, but rationalizes the individualist desire for the accumulation of wealth, positing it as an ethical, economic ideal.

Within Bitcoin's protocol, I understand the design of greed in a similar fashion to Weber's analysis: Bitcoin does not merely induce mania for wealth for the sole purpose of exploitation as in so many Ponzi schemes, but it instead rationalizes the greedy self-interest of its participants through a controlled incentive structure forming the material basis of its protocol. Bitcoin establishes this rationalization of greed through explicit analogies to gold mining grounding its digital metallism in metaphor, as explained in Satoshi's white paper describing the Bitcoin protocol:

> To compensate for increasing hardware speed and varying interest in running
> nodes over time, the proof-of-work difficulty is determined by a moving average

targeting an average number of blocks per hour. If they're generated too fast, the difficulty increases. . . .

By convention, the first transaction in a block is a special transaction that starts a new coin owned by the creator of the block. This adds an incentive for nodes to support the network, and provides a way to initially distribute coins into circulation, since there is no central authority to issue them. The steady addition of a constant, . . . amount of new coins is analogous to gold miners expending resources to add gold to circulation. In our case, it is CPU time and electricity that is expended. ("Bitcoin" 3–4)

In a discussion following the initial public release of the Bitcoin client, Satoshi further elaborates on this analogy to gold, expressing the hope that the currency's deflationary design would, through a rising value and the element of greed, promote further adoption of the system in a "positive feedback loop":

[I]ndeed there is nobody to act as central bank or federal reserve to adjust the money supply as the population of users grows. . . . [I]n this sense, it's more typical of a precious metal. Instead of the supply changing to keep the value the same, the supply is predetermined and the value changes. As the number of users grows, the value per coin increases. It has the potential for a positive feedback loop; as users increase, the value goes up, which could attract more users to take advantage of the increasing value. ("Bitcoin Open Source Implementation of P2P Currency")

Grounded by the cryptographic proof-of-work algorithm linking computational power to a tangible, material object combined with a carefully-designed competition for scarce, limited resources, the network produces an "alchemical recipe" for money through two key mechanisms both directly tied to individual self-interest. First, the variable mining difficulty induces a computational arms race among self-interested miners to claim the few coins trickling out of the system over time, which allows the amount of total coins in the system to be indirectly guided by the protocol's initial settings. Second, the fixed upper limit on the total bitcoin supply, set by Satoshi to 21 million coins, guarantees their scarcity, inducing a "positive feedback loop" as a second sort of controlled mania.

Since the network's launch, this positive feedback loop has produced a computational arms race that has grown to planetary proportions. In its early years, Bitcoin mining appealed to early-adopter, network-connected computer users who had machines with extra CPU cycles to spare. When the original client software was modified to take advantage of the fast floating-point processors on consumer graphics processing units, the demographics of mining expanded to include gamers and hobbyists who owned or invested in high-end aftermarket video cards that could more quickly generate the cryptographic hashes[11] awarded coins. More recently, as the Bitcoin network has grown into a billion-dollar economy, the hashing power arms race has shifted towards enterprising companies fabricating customized application-specific integrated circuit (ASIC) hardware, either running private Bitcoin server farms or selling/leasing the hardware to eager Bitcoin investors (Hill). Swedish-based KnC miner, for example, reportedly sold out $25 million worth of dedicated Bitcoin-mining ASIC machines within two weeks in December 2013, as the global hash rate of the Bitcoin network increased from around 20 gigahash/sec in January 2013 to over 12 million gigahash/sec in January 2014.

Bitcoin as Speculative Investment

Encouraged by the digital metallism embodied in its design and encouraged by its author, comparisons to gold have become commonplace among speculators and pundits commenting on the Bitcoin network, making it an attractive investment option among technologically-inclined libertarians and goldbugs. As one prominent example of this trend, in September 2013 the Winklevoss twins of early Facebook

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[11] A *hash* is the quantity of verifiable work performed by a machine in the Bitcoin network, and *gigahash/sec* is a measurement of the relative strength of an individual node in the network or the network in total. The hashing function used in Bitcoin is derived from the "Hashcash" mechanism (Back). As the mining difficulty (the probability that any single hash calculation will yield a valid bitcoin block) is adjusted based on the total strength of the Bitcoin network, the fixed rate of bitcoins produced the network is kept relatively constant independent of its total power.

fame began shilling their Bitcoin-derived Exchange Traded Fund by hawking Bitcoin as "Gold 2.0," using the common software-versioning trope of a "2.0" release number to indicate a technologically-advanced successor of an existing system, offering tulip-manic predictions of the exchange value of a bitcoin rising over 100 times its present price (Farrell).

As a speculative investment, Bitcoin's financial fiction can be summarized as the counterfactual proposition that bitcoins contain value. If bitcoins are valuable, then they can be effectively exchanged for goods or services. As opposed to physical goods, or even government-issued currencies backed by a guarantee to accept national currency as payment for public taxes or debt, bitcoins have no intrinsic use value or institutional support that would provide a stable support for a corresponding exchange value. Instead, the value of a bitcoin exchanged at any moment is much more speculative, grounded only in the quasi-religious belief that another economic subject (a "greater fool") will accept the currency as valuable in the future. In this case, lofty Utopian narratives of a future in which Bitcoin becomes the primary world currency for a global digital economy provide the currency with a self-justifying narrative of enormous potential value. As one example, an early Danish Bitcoin exchanger, Lars Holdgaard, created a website to "Calculate the future value of Bitcoins." Taking into account the fixed supply of 21 million Bitcoins, if the network grows to 0.25% of the global economy with a quarter of the coins used for transactions, then the price of a single Bitcoin would increase to $37368. "If you believe in Bitcoin, and have a believe [sic] it can be used in 0,05-1% of all transactions in the world, it will have a HUGE value. As an investment alone, this is a smart choice" (Holdgaard). Similarly, Mike Caldwell, an entrepreneur peddling "Casascius Coins," physical coins embedded with private keys linked to fixed denominations of Bitcoins, argues that the "fundamental value of a Bitcoin" is a speculative proposition: "To me, it is either worth zero, or it is worth a lot. It is either the financial revolution

of the 2010's, or it isn't. If a Bitcoin is not worth a lot of money, it is worth zero. There's no middle ground" (Caldwell).[12]

In this view, the simple value proposition in the Bitcoin network is akin to a digital version of Pascal's famous "wager," the theological argument for a rational belief in God based on the non-zero possibility of infinite reward should God indeed exist. The very likely possibility of an investment in Bitcoin ultimately becoming worthless is offset by the very unlikely but non-zero possibility of achieving unprecedented gains should the Bitcoin network manage to succeed in ultimately replacing the existing global financial institutions. In this way, Bitcoin as a speculative investment is sustained by a collective belief in the inevitability of its greater future value. The religious, even eschatological, overtones in this counterfactual proposition of ultimate value are clear.

Bitcoin as Enterprise

Somewhat related to the view of Bitcoin as a speculative investment is the view of the Bitcoin as an opportunity for entrepreneurial activity or capital investment. Considering the core of Bitcoin's algorithmic ideology is a political-economic axiom equating computing power with political-economic voice, it's perhaps not too surprising that Silicon Valley has quickly become a breeding ground of organized technical development, financial investment, and general entrepreneurial enthusiasm for Bitcoin-related products and services. For example, in an essay published in the New York Times, Marc Andreessen, the co-founder of Netscape and a large venture-capital firm, equates Bitcoin to the personal computer in 1975 and the Internet in 1993 as the next big transformative technology, having already invested

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[12] Caldwell's operation was suspended in November 2013 when the Financial Crimes Enforcement Network sent him a letter claiming that minting physical Bitcoins amounted to operating an unlicensed money transmitter business.

just under $50 million in Bitcoin-related companies (Andreessen). One way to characterize the symbolic struggle over Bitcoin is as a divide between techno-capitalist faith in the liberatory potential of technological protocol for entrepreneurial "creative destruction" and an entrenched oligopoly of neoliberal financial actors aligned with government actors backing the existing global financial system. Venture capital-financed Bitcoin entrepreneurs, viewing themselves as the spiritual successors to the libertarian heritage of early commercial Internet company success stories such as Netscape and PayPal, see an opportunity to shape Bitcoin into a global currency system that would more efficiently replace monetary regimes dominated by national currencies and precious metals, particularly in light of the loss of popular faith in existing financial systems following the global financial crisis. In this long-term strategic view Bitcoin is still in its infancy, and the hyper-competitive stage of institutional growth is still so young that new entrants still stand a chance to strike it rich by staking early claims.

In his essay, Andreessen concludes, "Bitcoin offers a sweeping vista of opportunity to reimagine how the financial system can and should work in the Internet era, and a catalyst to reshape that system in ways that are more powerful for individuals and businesses alike." Although this reimagining is still in its infancy, there's good reason to remain skeptical of such sweeping, transformative visions. The entrepreneurial vision Andreessen presents for Bitcoin as a government-free, libertarian world payment system of the future masks the enormous capture of democratic voice that such a system would entail if successfully realized at such a grand scale. From a political perspective, a government of "one-CPU-one-vote" would become a pure plutocracy. By linking money's universal ability to acquire property to the universality of autonomous, ungovernable agency of the libertarian Internet imaginary, Bitcoin ideologically fuses together two facets of the transcendental techno-bourgeois subject in a translation of computational power into universal

wealth. It replaces the form of money linked to the state's accumulation of administrative and political power with another form linked to the accumulation of computational and protocological power, allowing a decentralized control increasingly independent of the traditional mechanisms of national democracy, and thus more vulnerable to unchecked authoritarian influence from autonomous, powerful actors and corporations capable of making large investments in the technology sector.

Bitcoin as Media Story

One of McLuhan's boldly prophetic pronouncements about money is that our contemporary dynamics of mass media will be reflected in new money forms: "Today, electric technology puts the very concept of money in jeopardy, as the new dynamics of human interdependence shift from fragmenting media such as printing to inclusive or mass media like the telegraph" (139). From this perspective, I find one of the most salient components of Bitcoin's patterns of adoption within the expanding circulation of news about Bitcoin. One might even say that Bitcoin exists as a material reality of the mass media above all else.

In the United States, Bitcoin has been all over the news. According to a national poll, by December 2013 over 42% of Americans correctly answered that Bitcoin was a virtual currency (Bloomberg). Like the global spread of news of the discovery of gold in northern California in 1848, news of the rise of Bitcoin has itself been largely responsible for the succeeding cycles of wealth-grabbing euphoria, fueled by individualistic opportunism and the speculative possibility of accumulating great amounts of private wealth within a brief window of opportunity. However, vast temporal differences separate the dynamics of Bitcoin's adoption from the global onrush of prospectors toward reports of new sources of gold. Despite their material macroeconomic similarities and similar ideologies of economic autonomy from

nation-state control, gold has a material history as a valuable commodity spanning thousands of years, and a stable network of global trade throughout the world. Bitcoin, by comparison, is a very new digital fiction, built around an enthusiastic but still comparatively tiny network of believers that could be extinguished as easily and quickly as it was created. One illustrative contrast is the global rush of prospectors to Northern California in the years following the discovery of gold in the region compared to the tepid response to the Bitcoin network's initial launch in January 2009 which, without any established notoriety, started out as play money with no value whatsoever. As Marx's primal form of universal money within capitalism, gold is *a priori* valuable; in order for anyone to attribute any value at all to bitcoins, they must first hear and learn about it through the mass media. In this way, Bitcoin is a mass media story before it is anything else.

As a mass media story, Bitcoin expanded in cycles or stages, as the fragile network was tested by increasingly broad and diffuse layers of public support. The extreme fragility of Bitcoin's network effects and its dependency upon media exposure for its growth is most apparent in the enormous degree of influence that public communication channels and moments of broadened media exposure had over the contours of Bitcoin's early growth. Strong correlations have been found, for example, between Google and Wikipedia search volumes for Bitcoin and exchange rates for the currency.[13]

These correlations are already evident in the first and arguably most important digital media intervention by the early Bitcoin community in July 2010, following the release of version 0.3 of the Bitcoin client. After a week of discussion in a Bitcoin Forums thread debating the appropriate wording of a concise, general-audience introduction to the Bitcoin project ("Slashdot Submission For 1.0"), a Bitcoin community member submitted the news contribution to the tech-news web portal

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[13] For an recent quantitative analysis of these lines, see (Kristoufek).

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Slashdot on July 11, 2010, and was soon featured on its front page ("Bitcoin Releases Version 0.3"). The resulting "Slashdot effect" overloaded Bitcoin Market, the first and only automated Bitcoin exchange available at the time, bringing the trading server down for a full day ("Bitcoin Market Growing Pains"). The next day, the Bitcoin-US Dollar exchange rate jumped tenfold (from one-half cent to five cents per Bitcoin), with over 400 new Bitcoin clients connecting to the network, producing a similar tenfold increase in the network's total computational power ("Bitcoin is 'Growing Up': Feature Request").

This early media flurry was only the first bubble-like expansion of Bitcoin into a broader public consciousness. The next time Bitcoin pushed the boundaries of acceptance, its own rise in popularity became the news story propelling it along (e.g., "Online-Only Currency BitCoin Reaches Dollar Parity"). These headlines fueled steadily increasing enthusiasm and exposure, leading to the currency's next big bubble around July 2011. This time, the correction following the bubble was much sharper and prolonged, triggered by a massive security breach at Mt. Gox, the Bitcoin exchange handling the vast majority of trading activity at the time.

The next bubble around April 2013 triggered a new news cycle that expanded the audience even further, so that a new wave of people around the world heard news of the rise of Bitcoin for the first time. This bubble was typically rationalized by news of a banking crisis in Cyprus which threatened to seize a portion of national bank deposits, where the strong backlash against the government's economic decision that would directly affecting the holdings of individual citizens presumably many look to accessible solutions for shuttling their private wealth outside the influence of their government (Bustillos). Around the same time, the ongoing devaluation of the Argentinan peso along with capital controls on foreign currency and precious metal exchange fueled interest in the virtual currency as a hedge against further national inflation (*Bitcoins in Argentina*). With the subsequent influx of new buyers

and corresponding increase in exchange value, the total market captured by Bitcoin currency exceeded a billion US dollars, making Bitcoin's popularity again its own newsworthy event. Talking heads on mainstream financial television channels and radio news discussing Bitcoin became commonplace, and some even reported a ticker displaying the Bitcoin exchange rate on MSNBC for a brief period.

A further recent wave of expansion began with a favorable in-depth documentary on Bitcoin that aired on China's state television broadcast network CCTV in May 2013 (Stacke). As news about Bitcoin spread around the country more news stories about Bitcoin's adoption and investment energy fed an increasing cycle, leading to search engine Baidu's decision to accept Bitcoin payments in October. By November 2013, Bitcoin exchange BTC China had quickly risen to become the largest bitcoin currency exchange by volume.

The perspective of Bitcoin as mass media story therefore provides a key component of the narrative underlying its cycles of growth and adoption that are fundamentally different from the laws governing the prices of existing globally-distributed commodities or state-governed currencies. The "viral" growth and adoption of Bitcoin has fundamentally depended upon the Internet for the global acceleration of its mass media story through several cycles, and the latter is largely responsible for the incredible dynamism of the currency's global adoption. However, as McLuhan warned, such a vital dependence upon the mass media also throws the very concept of money in jeopardy: given Bitcoin's ongoing dependency upon the novelty of its mass media story for its early stages of growth and adoption, it is therefore an open question whether Bitcoin can continue to produce itself as a form of money if or when its story has been told everywhere, and it no longer circulates as news.

Bitcoin as Money?

The proposition that "Bitcoin is money" is often contested through reference to the four traditional functions of money. Introductory macroeconomic textbooks often begin a high-level discussion of these modern functions of money by citing the traditional couplet, "Money is a matter of functions four, a medium, a measure, a standard, a store."[14] These four functions, which derive from neo-classical economic theory, separate money into a medium of exchange; a measure or "unit of account" of price; a standard of deferred payment (e.g., for settling debts); and a store of (long-term) value.

This separation of money into four functions comes from Stanley Jevons's 1875 treatise, *Money and the Mechanism of Exchange*. Jevons separated money into its functions as "a medium of exchange," "a common measure of value," "a standard of value," and "a store of value" (13–5), adding: "It is in the highest degree important that the reader should discriminate carefully and constantly between the four functions which money fulfils, at least in modern societies" (16). Although different times and places in history have delegated some of these functions to different physical media, adherents of this unified theory of money suggest that money is at its most ideal (that is, it behaves most like "money") when a single substance supports all four of these functions. In the case of Bitcoin, its function as a secure, distributed medium of exchange is its strongest virtue. However, the possibility of Bitcoin successfully fulfilling the other three functions of money have been disputed due to its volatility, as an economic research report by David Yermack attests: "bitcoin does not behave much like a currency according to the criteria widely used by economists. Instead bitcoin resembles a speculative investment similar to the Internet stocks of the late 1990s" (2).

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[14] See (Dwivedi 158) for an example. The couplet is typically unattributed; the earliest known reference I have found is (Milnes 55).

However, rather than evaluate according to this neoclassical paradigm, I find that identifying money strictly in terms of the unification of these four functions becomes less useful within ludocapitalism, where the emergence and cultural acceptance of various manifestations of play money within our financial institutions encourage these classical functions of money to diverge into distinct forms. Even Jevons emphasized the limitations of assuming a unified understanding of money as the basis of his four-functions separation: "We come to regard as almost necessary that union of functions which is, at the most, a matter of convenience, and may not always be desirable. We might certainly employ one substance as a medium of exchange, a second as a measure of value, a third as a standard of value, and a fourth as a store of value" (16). Instead, I argue that Bitcoin functions as money in relation to each of the various perspectives I have used to interpret the project's social significance to date. In this way, my understanding of Bitcoin as money is comprised of all of the multifaceted social currents of "spirit" that, as Simmel's philosophy of money argued with analogy to art, are all collectively reflected in its final economic valuation, none of which taken on its own would be necessary or sufficient.

Bitcoin as Discursive Practice

My final interpretation of Bitcoin's significance leads me beyond its immediate economic valuation as money, beyond even the spirit of the particular monetary regime it establishes: I interpret Bitcoin more generally in terms of Foucault's "transdiscursive" initiation of a discursive practice. For Foucault, the initiator of a discursive practice is a subject who "produced not only their own work, but the possibility and rules of formation of other texts" ("What Is an Author?" 131). The vast fields of discourse established by the works of Marx and Freud, Foucault offers for example, are much more significant than that of the work of a popular novelist. While the latter might produce a popular genre involving certain narrative themes,

literary techniques or the like, what distinguishes the former is its ability to support not merely adaptations or analogies, but that it constructs a discursive stage for the introduction of concepts entirely different from its own but nonetheless within the field it initiated. Likewise, the initiation of a discursive practice is different from the founding of a new science in that future developments of a scientific practice can reconstruct its theoretical foundations according to future empirical evidence, whereas a discursive practice is "heterogeneous to its ulterior transformations" (133). In a discursive practice a "return" to the original initiation has the potential to transform our ongoing understanding of the field, as such a return can "reinforce the enigmatic link between an author and his works" (136) that is not possible in scientific practice.

As a technical practice, the Bitcoin distributed network itself is incapable of such a "return" to the original work, as the public decentralized ledger makes all transactions irreversible. However, it can also be said that Bitcoin has founded its own discursive practice, one that split the ongoing discourse on money itself into pre-Bitcoin and post-Bitcoin moments. It is in this sense that, regardless of the Bitcoin network's present utility or longevity or whether the Pascalian wager of the network's early adopters ultimately succeeds or fails, its existence as an inaugurative event is neither a true nor false statement, just as the question of whether Bitcoin is or isn't neoclassical "money" is also not the dispositive question. It is also in this sense that the practice of Bitcoin is worth returning to, as it has captured something about the present technocultural moment that invites scrutiny and reflection.

In order to distinguish the general social significance of Bitcoin's discursive practice from the specific economic significance of its particular monetary network, I consider the latter in terms of Galloway's concept of *protocol* as a strategy of control in decentralized networks. In order to participate in the Bitcoin network, one must implicitly accept the rules of the game embedded in the protocol accepted by all other players. In order to become a bitcoin-trading subject, one must therefore accept

the entire history inscribed in the immutable, decentralized ledger of transactions recording the ownership and history of every single bitcoin created to date. In this way, control is maintained within the Bitcoin network through protocol, and the particular rules and parameters comprising Bitcoin initially established by Satoshi are collectively enforced through a consensus of continued adoption, long after the original author's absence.

Galloway's thesis of *Protocol* is that the decentralization of network architectures does not determine their inherent liberation, but rather engenders new forms and topologies of control and struggle that take place within the protocol itself. However, I believe that the significance of Bitcoin as a discursive practice beyond its particular network protocol demonstrates that the material force of protocol can be resisted through social means beyond than hypertrophic exploits of the protocol itself. An under-recognized facet of Galloway's protocol theory that I wish to highlight is his insistence on protocol's tendency to become reified as something more solid or material than mere social consensus:

> As one learns more and more about the networks of protocological control, it becomes almost second nature to project protocol into every physical system. . . . But protocol is more than simply a synonym for "the rules." . . . [A] better synonym for protocol might be "the practical," or even "the sensible." It is a physical logic that delivers two things in parallel: the solution to a problem, and the background rationale for why that solution has been selected as the best. (244–5)

It is only through this sort of protocological reification, grounded in a digital metallism supported by a growing community of adopters and investors, that an ethereal communications network such as Bitcoin can be viewed as grounded in a "physical logic" providing it a material basis. Galloway's materialist description of protocol here masks the everyday complexities of contemporary information capitalism: protocol adoption often has very little to do with what protocol solution is

"the best" in relation to an isolated problem, and very much to do with the protocol's adoption within discursive networks. In this vein, Bitcoin has generated a simulacrum of the dynamism of information capitalism, now surrounded by hundreds of forks of the Bitcoin software project, all running their own fully-functional alternative crypto-currency networks, competing for attention, market share and exchange value within a vibrant "altcoin" diaspora.

Bitcoin's Diaspora

The spread of Bitcoin among software developers and entrepreneurs, combined with the free, public distribution of its published white paper and open-source software project (without any intellectual property claims of any kind attached), has triggered an unprecedented flood of Bitcoin forks, clones, and similarly-inspired virtual currency projects.[15] It is in full view of these alternative currencies that Bitcoin's greatest significance as initiator of a new discursive practice of money can best be appreciated. Beyond the particular valuation of bitcoins within its original network, we can consider Bitcoin as a generalized technique in subjecting economic activity to decentralized protocological control, one whose most significant implications may have yet to be realized through one of its hundreds of experimental evolutions.

This alternate currency diaspora contains many fledgling networks that are slight modifications or even exact source-code replicas of Bitcoin, allowing participants to become early-adopters on new currency networks where everyone's balances are reset to zero. Other alternate currencies attempt to address perceived deficiencies by tweaking technical aspects of Bitcoin's algorithm, or to extend the central concepts of decentralized currency to new applications. Through a brief discussion of two of these projects, Freicoin and Ripple, I will show how Bitcoin has established not just its

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[15] See (Popper); as of September 2014, at least 486 unique crypto-currencies exist on the Internet (CoinMarketCap).

own decentralized currency network but also an experimental mode of economic and protocological discourse that supports a wide array of alternative deviations from the particular spirit of money Bitcoin itself envisioned.

Freicoin

Freicoin is an alt-currency designed around a combination of Bitcoin's decentralized currency technology with the additional concept of demurrage, as introduced by the German theoretical economist, social activist, and anarchist Silvio Gesell in the early 20th century. The crux of Gesell's critique of the standard government-centralized monetary systems of his time, particularly the practice of pegging the exchange rate of official paper currencies to stores of precious metals such as gold or silver, is that the individual incentive to hoard a fixed supply of money such as gold as a commodity during periods of deflation further reduces the money in circulation, causing a deflationary spiral and general systemic crisis throughout the linked society. Gesell proposed the concept of *freigeld* 'free money' as a currency system implementing demurrage, a mechanism causing all issued currency to depreciate in value a small percentage over time to approximate the natural depreciation of consumer goods and encourage spending.

Freicoin is developed as an open-source software fork of Bitcoin's decentralized client, incorporating an automatic fixed-rate demurrage on all currency in the system. In addition, the initial distribution of its 100 million units of currency is also adjusted to offer only a fraction of coins to the pool of machines computing the cryptographic hashes necessary to secure the network, with 80% of the coins going to the Freicoin Foundation, a non-profit foundation established by the developers with a mission "to promote Freicoin and support a sustainable world" (Friedenbach and Timón).

Despite its honorable intentions, it seems that one of Freicoin's greatest barriers to adoption parallels Keynes's critique of Gesell's original freigeld proposal: given the

choice of an open market and beginning with a state of very low adoption, why would anyone choose to adopt or hold Freicoin at all, as opposed to other stores of value that would depreciate less over time?[16] Gesell's *freigeld* proposal assumed a state-issued monopoly of money, where demurrage money would be standardized as the only form of payment for taxes and other public debts, thus enforcing its broad use. Such a system could counter Keynes's critique through protecting state-issued demurrage money against other fixed assets, for example through sales or property taxes on such stores of value. Without any state power to enforce standardization, however, Friecoin can't harness any self-contained economic cycle that would enable demurrage to actually encourage spending rather than discourage use of the currency altogether in light of substitutes.

Freicoin nonetheless still represents an interesting experiment in a different kind of money system, one linked to a public organization with marked differences from Bitcoin's own techno-libertarian algorithmic ideology. This extension of Bitcoin's technology demonstrates that the concept of decentralized currency can be used to promote alternative protocological visions of the future of money.

Ripple

Ripple is another alt-currency project that attempts to differentiate itself from Bitcoin by offering a general-purpose distributed debt-accounting service rather than just a fixed currency standard. The organizational differences between Bitcoin and Ripple are most striking: Ripple is centrally organized by a for-profit corporation, Ripple Labs, Inc. (formerly OpenCoin, Inc.), founded by a serial entrepreneur and financially backed by a number of prominent Silicon Valley venture capitalist firms including

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[16] Keynes read Gesell's theories with great interest, and accurately noted that the central problem with any demurrage system is the inevitable problem of substitute currencies: "Thus if currency notes were to be deprived of their liquidity-premium by the stamping system, a long series of substitutes would step into their shoes—bank-money, debts at call, foreign money, jewellery and the precious metals generally, and so forth" (bk. 6, ch. 23, sec. 6).

Google Ventures and Andreessen Horowitz. Although the Ripple network itself is decentralized through a peer-to-peer network architecture, the protocol regulating its currency distribution differs markedly from Bitcoin's proof-of-work game controlling the dispersed production of new coins. Instead, Ripple Labs designed its protocol so that all 100 billion of the Ripple network's "ripple" currency units (XRP) begin in control of Ripple Labs, and are selectively distributed to early adopters and partners, sold to currency exchange systems, and otherwise released into circulation according to its corporate interests ("XRP Distribution"). Through such a carefully-controlled rollout, Ripple Labs's strategy draws parallels to a more conventional entrepreneurial venture, controlling (and monetizing) the network effects of a distributed system by gradually expanding access to broader populations.

Ripple's innovative currency-based business model thus conceals a subtle contradiction. On the one hand, the Ripple network architecture is still a decentralized network in Bitcoin fashion, where currency distributed throughout the network is secure, transactions are transparent on a public ledger, and none of the economic activity is directly controlled by a single authority. On the other hand, the majority ownership of the primary currency itself serves as a means of centralized, economic control of the network. As opposed to Bitcoin's currency which enters circulation through its protocol-established proof-of-work competition, Ripple's XRP currency (Ripple credits, or "ripples") enters circulation through an opaque, institution-driven process, similar to a private company's stock options. In addition to a lack of transparency in Ripple Labs's plans for future distribution of the currency, 20 billion XRP, or 20% of the entire economy, was initially granted directly to the founding developers on undisclosed terms. In this way, ripples are a controlled, fictional commodity like other equity securities, but rather than each currency unit representing a fixed portion of the company's future profit, the network is only indirectly linked to the company through its majority ownership of the currency.

The public vision for Ripple is a dream of advancing the technoliberal ideals of friction-free capitalism through the efficiencies of a global, digital currency. However, the project raises questions about whether such a system can be considered a decentralized currency at all, if its currency stores originate from a single controlling corporate source, with a mandate to maximize the network's value alongside its investors' wealth. Instead, the experiment of Ripple more convincingly demonstrates an innovative method of raising capital for a decentralized corporation through the circulation of virtual currency units to the public.

In Math We Trust

Ripple Labs CEO Chris Larsen hopes that Ripple will become the next generation of "math-based currencies, . . . needed as a way to move money frictionlessly," of which Bitcoin is the paradigmatic instance (Larsen). This term doesn't refer to any specific mathematical technique, formula or field, but is rather a general reference to the "real" materialism conferred by mathematical truth. Larson claims that despite its physical substance gold is also a "math-based currency," because of the durable truth that any substance containing 79 protons still counts as gold, regardless of political opinion. By this logic, in a strangely idealist inversion of metallism, a currency is "mathematical" when its system of trust and control no longer relies upon a distinct state or political authority, but is instead organized based on a decentralized consensus through an enacted protocol.[17] Tyler Winklevoss, manager of the Winklevoss Bitcoin Trust, endorses a similar mathematical ideology in an interview publicly announcing his venture's control of over one percent of all Bitcoins: "We have elected to put our

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[17] A recent Ripple Labs white paper restates this argument: "The supply of a math-based currency is governed by the laws of mathematics. There is no human intervention beyond the creation of the protocol rules" ("The Ripple Protocol Primer" 9).

money and our faith in a mathematical framework that is free of politics and human error" (Popper and Lattman).

Such a blind faith in decentralized networks is why Galloway argues that protocol can become "dangerous" and take on "authoritarian undertones" (*Protocol* 245). The desire for a "math-based currency" to facilitate the global, frictionless economy of information capitalism is the latest iteration in the long Enlightenment history of discursive attempts to reduce the power of human reason to the pure formalism of number. Horkheimer and Adorno's famous argument against the "Myth of Enlightenment" as ideology of instrumental reason reveals a conflation of the controlling power of prehistorical mythological symbols with the formal mathematical symbols cherished by Enlightenment ideals:

> Enlightenment pushed aside the classical demand to "think thinking," . . . Mathematical procedure became a kind of ritual of thought. . . . The reduction of thought to a mathematical apparatus condemns the world to be its own measure. What appears as the triumph of subjectivity, the subjection of all existing things to logical formalism, is bought with the obedient subordination of reason to what is immediately at hand. To grasp existing things as such, not merely to note their abstract spatial-temporal relationships, by which they can then be seized, but, on the contrary, to think of them as surfaces, as mediated conceptual moments which are only fulfilled by revealing their social, historical, and human meaning—this whole aspiration of knowledge is abandoned. Knowledge does not consist in mere perception, classification, and calculation but precisely in the determining negation of whatever is directly at hand. Instead of such negation, mathematical formalism, whose medium, number, is the most abstract form of the immediate, arrests all thought at mere immediacy. (19–20)

Here, Horkheimer and Adorno's critique the unflinching faith in pure, mathematical reason found in both proto-fascist positivism and techno-libertarian dogma. Instead of taking things as they seem to be in a formal, mathematical, ahistorical certainty, they urge the thinking subject to relate their object to a "mediated conceptual moment" revealing their "social, historical, and human meaning." Faith in the idea

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of a math-based currency supposedly devoid of political affiliation is nonetheless constructed through a distinct ideology of social and historical associations, politics, meanings and metaphors together comprising a contemporary spirit of computation of which Bitcoin is the paradigmatic instance.

If it is indeed possible to recapture Bitcoin as a mediated conceptual moment beyond the compulsive drive toward the immediacy of friction-free global capital and the reduction of all value to pure, universal number, I believe it will require translating its discursive practices beyond its unified libertarian ledger of transactions, into other diverse rules of formation integrated with specific human, cultural or other ideological values. In the final section, I will interrogate the question of the unilateral rationality of wealth through Marx's comparison of love against money.

4.4   Conclusions

Love and Money

In his 1844 manuscript on "The Power of Money," Marx offers an early version of his commodity theory of money as the universal equivalent of exchange, emphasizing money's effect of reducing mediated social existence to an objective property relation:

> Money is the procurer between man's need and the object, between his life and his means of life. But that which mediates my life for me, also mediates the existence of other people for me. For me it is the other person. . . . That which is for me through the medium of money—that for which I can pay (i.e., which money can buy)—that am I myself, the possessor of the money. The extent of the power of money is the extent of my power.

This characterization of money as the extent of man's power is later reflected in McLuhan's own maxim of the medium as the "extension of man." However, here Marx more critically and forcefully presents the alienating impact of this economic mediation in a contradictory light. The objectivity of economic exchange enters into

a tension against reciprocal social relations of a more subjective (or intersubjective) humanity, as represented by the exchange of love:

> Assume man to be man and his relationship to the world to be a human one: then you can exchange love only for love, trust for trust, etc. If you want to enjoy art, you must be an artistically cultivated person; if you want to exercise influence over other people, you must be a person with a stimulating and encouraging effect on other people. Every one of your relations to man and to nature must be a specific expression, corresponding to the object of your will, of your real individual life. If you love without evoking love in return—that is, if your loving as loving does not produce reciprocal love; if through a living expression of yourself as a loving person you do not make yourself a beloved one, then your love is impotent—a misfortune.

For Marx, the substitution of money for more reciprocal expressions of intersubjective relations threatens to distort the assumed "human" constitution of the individual subject. The substitution of money, which is one-sided, in exchange for love or any other human relations produces "a misfortune," the opposite of true wealth. Through this passage, Marx presents the view that in contrast to the power of money which mediates the existence of the other, the authenticity or legitimacy of human forms of wealth are rooted in reciprocal social relations, in the mutual recognition of the other. Simmel recapitulates Marx's sentiment in a similar meditation on the exchange of love:

> It is above all the exchange of economic values that involves the notion of sacrifice. When we exchange love for love, we have no other use for its inner energy and, leaving aside any later consequences, we do not sacrifice any good. . . . But economic exchange, . . . always signifies the sacrifice of an otherwise useful good, however much eudaemonistic gain is involved. (80)

These passages on the essential incompatibility between love and economic exchange present another view of Simmel's spiritualization of money, suggesting that the human needs, norms, desires and passions of an economic community, collective, class, or nation develop in tension with the objective, quantitative numeracy of money. In Bitcoin, the link between love and money is projected into an unwavering

faith in the power of computation, where a techno-narcissism obsessed with the awesome power of computing infrastructure pervades its discursive production of value.

However, if we understand money not as a transcendental universal of exchange but as a symbol of wealth embodied in specific media, then there is an ambivalent potential for social meanings of money to be consciously revitalized through the production of new concepts of wealth. In Theology of Money, Philip Goodchild frames this question in critical terms as "the problem of the emancipation of evaluation" (258):

> [I]n an age of approaching crisis and the tyranny of debt, little can be done until the spectral power of money is addressed. It is urgent, above all else, that time, attention, and devotion be committed to developing new institutions of credit that make effective evaluations once more possible. (259)

The spiritualization of money taking place within contemporary ludocapitalism that I have interrogated in this chapter has not yet explicitly taken the production of new effective evaluations as its primary ethical objective. However, the particular qualities of this technoliberal spirit, as embodied within the Bitcoin software project and forks, bold investments in unprecedented economic experiments, and lofty visions of the institutional future of money diverging from national monetary policy do contain novel forms of collective deliberation and patterns of decentralized economic consensus that, I believe, have the potential to engender a diversity of effective evaluations, some of which may support radically new and humane forms of economic life.

Digital Alchemy

In conclusion, I look forward to an even further intersection between new innovations digital play money inspired by Bitcoin's example and critical discourses on

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the production of wealth and effective evaluations of value. In this vein, economic journalist David Boyle offers the metaphor of a "new alchemy" to describe individuals and communities attempting to effect social change through enacting alternate forms of money collectively known as LETS (Local Exchange and Trading Systems). Opposed to the superficial view of alchemy as the opportunistic production of base metals into gold, Boyle's alchemy seeks to produce a new economic system capable of validating alternate visions of wealth. Systems he observes include local currencies such as the Time Dollar, which enables participants to exchange hours of informal volunteer or community service work as an idealistic instantiation of labor theories of value built around local community engagement. Boyle summarizes the set of questions some of these new alchemists have posed through the creation of alternate currencies:

> How can society afford the enormous costs of looking after growing numbers of old people—especially when government budgets are being cut?
> How can communities defend their local economies, when local earnings are siphoned out of the area by big business or distant utilities?
> How can we create a more diverse and sustainable economy locally—and reduce the need for goods to be transported at heavy environmental cost?
> How can we create a reliable measure of value so that our local products and earnings stay valuable during inflation or worldwide currency instability?
> How can we rebuild communities, friendships and a sense of family so that people look after each other? (200)

The Silicon Valley dream of disintermediation, reducing the dependence on financial middlemen in the name of an abstract, mathematical efficiency of a frictionless economy transcending political democracy, is not the only scenario of progress that Bitcoin makes possible. Among the hundreds of alternative digital currencies that have formed in the Bitcoin diaspora, many of them are producing truly alternate, experimental visions of political-economic reality. Insofar as each of these experiments is also envisioning the production of new forms of wealth, I see the political goals

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of the fringes of the Bitcoin diaspora such as Freicoin and Boyle's New Alchemy to become increasingly aligned in the future, producing what might be called a "digital alchemy" of technological-economic experimentation.

Let us continue to produce playful reconfigurations of money, in the sense of fictional constructions of wealth similar to those invented currencies at the heart of virtual game economies, particularly formations that counter a universal, global commodification of value in recognition of alternate, fanciful constructions of wealth. Play money in this sense has the potential to produce and support new, experimental forms of life under post-industrial capitalism, and a more direct engagement along these lines between the Bitcoin diaspora and that of LETS currencies would be welcome.

From a more general perspective, the Bitcoin system comprised of contrived competition among cryptographic computations, fixed allocation of scarce resources driving speculative investments and early adoption, and expanding cycles of promotion through mass media stories represents both a protocological foundation for a novel system of money, and a simulacrum of the political-economic logic of ludocapitalism. I believe that the potential for Bitcoin as a mass-mediated political model, and the ramifications of the expansion of its "one-CPU-one-vote" paradigm of technologically-mediated governance, still have yet to be fully developed in practice.

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