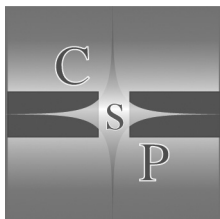


Tomorrow through the Past

Tomorrow through the Past
Neal Stephenson and the Project of Global
Modernization

Edited by

Jonathan P. Lewis



CAMBRIDGE SCHOLARS PRESS

Tomorrow through the Past: Neal Stephenson and the Project of Global Modernization, edited by
Jonathan P. Lewis

This book first published 2006 by

Cambridge Scholars Press

15 Angerton Gardens, Newcastle, NE5 2JA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Copyright © 2006 by Jonathan P. Lewis and contributors

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system,
or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or
otherwise, without the prior permission of the copyright owner.

ISBN 1-84718-061-2

TABLE OF CONTENTS

Acknowledgements	vii
Preface	viii
Introduction	xi
Chapter One	1
Interdisciplinary Sage: Reading Stephenson Across the Curriculum Gray Scott	
Chapter Two.....	22
Big U(topia): Neal Stephenson’s Academic Novel Peter S. Sands	
Chapter Three.....	39
Ecosophical Struggle in Neal Stephenson’s <i>Zodiac</i> Nicholas P. Spencer	
Chapter Four	57
Tongue-Tied in America’s Metaverse: The Nation as Meta-Language and the Myth of Consensus in Neal Stephenson’s <i>Snow Crash</i> Shane A. Shukis	
Chapter Five.....	69
Reclaiming the Subversive: Victorian Morality in Neal Stephenson’s <i>The Diamond Age</i> Kathleen McClancy	
Chapter Six.....	86
“Confound the Language of all the Earth”: User Friendly Translation and the Tower of Babel in <i>In the Beginning...Was the Command Line</i> Steven J. Zani	
Chapter Seven.....	98
Crypto-Economics: Neal Stephenson, Milton Friedman, and Post- Postmodernism Michael Tratner	

Chapter Eight	114
House of War, House of Peace: The Enlightenment and Terror in <i>The Baroque Cycle</i> Jonathan P. Lewis	
An Interview with Neal Stephenson	133
Chronology	137
Selected Bibliography	139
Notes on Contributors	142
Index	144

ACKNOWLEDGEMENTS

I must first thank Amanda Millar, Carol Koulikourdi, and Andy Nercessian at Cambridge Scholars Press for their encouragement of this project. Second, I would like to thank Sylvia Berger and Danielle Day in the Department of Classical and Modern Languages at the University of Louisville as this collection began with two panels at the 2006 XXth Century Literature Conference. Those who participated remain grateful to Sylvia and Danielle for affording us the opportunity to exchange ideas and to those who came to the sessions and offered useful feedback. I would also like to personally thank the Heuser family of Louisville for their annual hospitality.

Thank you to all the contributors for their fine work; from the original responses, to the conference and the Seelbach in Louisville, and onward, this project has been a joy. Brian Croxall, a doctoral candidate at Emory University, deserves mention here as a contributor to the conference proceedings and the discussions afterward. Unfortunately, time constraints prevented extension of his paper on *Cryptonomicon* for this collection. Hopefully, he will be able to incorporate some of that work into his dissertation or other, future, projects.

I would also like to thank my colleagues at the University of North Carolina at Pembroke, especially Roger Ladd and Mark Canada who read parts of the manuscript and offered many helpful suggestions. I also extend my gratitude to Dennis Sigmon, Carolyn Price, and Tina Feldman in the Department of English, Theatre, and Language at UNCP for their support in this and other scholarly endeavors.

Thanks are also due to Ros Perrotta at Darhansoff, Verrill, Feldman Literary Agents for arranging the interview with Stephenson, and sincere appreciation are due to Neal for his time, his candor, and his works.

Finally, I dedicate this work to my family.

PREFACE

Neal Stephenson was born in 1959; unlike some of the writers he is compared to, including Thomas Pynchon and Don DeLillo, he is a child of the 1960s and '70s, not the 1940s and '50s. In particular, Stephenson's fifth novel, *Cryptonomicon* (1999), has drawn comparison with both *Gravity's Rainbow* (1973) and *Underworld* (1997); Stephenson has said such associations do not displease him, but what distinguishes his voice and body of work is his examination of technological innovations coupled with a fast-paced prose style that appeals to a wide audience ranging from SF enthusiasts to hard scientists and literary scholars. And while Stephenson is closer in age to William T. Vollman and David Foster Wallace, he generally displays a less ironic sensibility than such writers, and *Snow Crash* (1992) and *The Diamond Age* (1995) certainly fit more within the boundaries of genre fiction, particularly science fiction. Likewise, while Wallace's short works appear in *Harper's* and *Gourmet*, Stephenson's appear in *Wired* and *Forbes*.

Although Stephenson grew up with the Vietnam War, not the Second World War like DeLillo and Pynchon, thus far, only one of his characters saw military service in Vietnam and it occurs off the page. On the other hand, World War Two figures as an important connection between two of the main characters in his breakthrough novel, *Snow Crash*, and nearly half of *Cryptonomicon* is set in the European and the Pacific theaters of war. Most importantly, throughout his novels, Neal Stephenson continually demonstrates the human costs of global modernization, and although his stories always revolve around the creative forces in societies—the engineers, the innovators, the savants—they do so without completely sacrificing these characters' humanity to celebrate or fetishize their handiwork.

Unlike such writers as Wallace, John Barth, and Toni Morrison, Stephenson does not hold a teaching post, nor does he regularly appear at writers' conferences and the like; we might term him a literary hacker coding his narratives each morning. He also sits on the board of Blue Origin, Amazon.com founder Jeff Bezos' space exploration start-up. He says that his down time in the afternoons recharges his creative batteries, but like his most famous character, *Snow Crash*'s Hiro Protagonist, one can imagine Stephenson hunkering down in his office listening to speed metal and other "relentlessly loud" music while coding his texts.¹ The metaphor of Stephenson as a kind of literary engineer programming his texts fails a bit with the knowledge that he

wrote the first draft of the immense, three volume *Baroque Cycle* (2003-2004) in long hand. Perhaps a better metaphor can be drawn from *Cryptonicon*, where an IT entrepreneur named Randy Waterhouse employs an epistemology drawn from J.R.R. Tolkien's *Lord of the Rings* (1954-55) to describe himself and others. He labels academics, such as his girlfriend Charlene, "Hobbits," saying that they are squabbling creatures, out of touch with the real world, and living in the protected, isolated Shire that is the ivory tower. By contrast, Randy thinks of himself as one of Tolkien's Dwarves: "stout, taciturn, vaguely magical characters who spent a lot of time in the dark hammering out beautiful things, e.g. Rings of Power" (80-81). While Stephenson is a thin man, he generally does not seek publicity; unlike Wallace, for example, he has not appeared on programs like *The Charlie Rose Show*, but he is surely not in Salinger's or Pynchon's league as far as being a recluse. As he says on his website, his time is spoken for. But there is perhaps some self-effacement in the Tolkien epistemology, with the image of Stephenson going down to the basement to hammer out his beautiful creations while groups like Soundgarden or Audioslave pound away on his eardrums.

This collection began with five presentations at the 2006 XXth Century Literature Conference at the University of Louisville; four of those essays appear here in expanded versions. Although his works are now met by reviews in popular magazines and newspapers as well as academic journals, this is the first volume of scholarly essays focused exclusively on Stephenson. The contributors hope that the essays will open the works to general readers and instructors and provide a foundation for academics building the body of critical responses. After a general introduction to Stephenson, the novels, and some of his major themes, we will examine each novel originally published under Stephenson's name (more on that shortly). There is one essay on Stephenson's long non-fiction piece on computer operating systems, *In the Beginning ... Was the Command Line* (1999); however, we will not examine his uncollected short stories, shorter non-fiction pieces, or the collaborations between Stephenson and his uncle George F. Jewsbury originally published under the name "Stephen Bury," *Interface* (1994) and *The Cobweb* (1996). In 2005, these novels were republished under the names Neal Stephenson and "J. Frederick George," Jewsbury's pseudonym. They are thrillers along the lines of Tom Clancy's Jack Ryan series, and Stephenson has said that at first, he and his uncle thought that Stephen Bury would support Neal Stephenson's work. Since *Snow Crash*, the Stephenson name has been able to carry itself, to say the very least. Most of all, we feel that as Stephenson's work has expanded beyond the early "Damn! I hadn't thought of *that* but somebody should *totally* do it!" works to the mature engagements with the scope and scale of modernization in western civilization,

it is time to afford his works the attention they demand. He is one of America's finest writers, with a career that promises continued, relentless challenges to notions of "genre fiction" itself while aggressively setting intellectual and technological agendas.

INTRODUCTION

Biography

David Town Stephenson and Janet Elaine Jewsbury met in Pullman, Washington in 1954; they were married three years later. They were students at Washington State University where David majored in electrical engineering, Janet in chemistry. After graduation, David's Army service and graduate work took them to Massachusetts, Maryland, and Illinois. More importantly, Stephenson's parents both come from families with scientific and academic traditions: David's father was a physics professor and Janet's father was a biochemistry professor. While we should perhaps take the "About the Author" section of *Snow Crash* with a large grain of salt (see author interview), Stephenson there describes his family as "a clan of rootless, itinerant hard-science and engineering professors (mostly Pac-10, Big 10, and Big 8 with the occasional wild strain of Ivy)" (441). It is true that from 1960 to 1966, Janet was a laboratory technician in biochemistry, and David was a graduate student at the University of Illinois. By 1966, David had completed his doctoral work and took a position at Iowa State University in the Department of Electrical and Computer Engineering; he is now an emeritus professor and active with a group that plays medieval music on period instruments. In 1973, Janet returned to the lab, working in the Biology Department at Iowa State until her retirement in 1992. Demonstrating this "clan's" wide range of interests, Janet's brother George F. Jewsbury, Stephenson's collaborator on the "Stephen Bury" novels, recently retired from his career as a historian at Oklahoma State University. It is easy to see how deeply the family's interests, careers, and predilections impacted Stephenson's writings, and one can surely see some roots of the Waterhouse clan, a group composed of mathematicians, engineers, astronomers, linguists (including Qwghlmian, the invented language of Stephenson's fictional island nation in the North Sea), and physicists in *Cryptonomicon* and *The Baroque Cycle*, in the Jewsbury and Stephenson families.

Neal Town Stephenson was born at Ft. Meade, Maryland, home of the National Security Agency, on October 31, 1959; his sisters were born in 1963 and 1969. He grew up in two college towns, Urbana and Ames, and as he describes *In the Beginning ... Was the Command Line*, he was first exposed to computers at Ames High School: "after a few introductory lectures, we students

were granted admission into a tiny room containing a teletype, a telephone, and an old-fashioned modem consisting of a metal box with a pair of rubber cups on the top” (9). It was a watershed moment, to be sure, but one may notice that nowhere in this description does the word “computer” appear. In those dark days, Neal and his classmates interfaced with the mainframe at Iowa State through the same technology that had been sending and receiving telegrams for decades. It was slow and arduous work, but at least there was no spam. More importantly, of course, the seed of Stephenson’s interest in working with computers was sown in Ames and grew to play an important role in his college career and his literary interests.

He graduated from Ames High School in 1977 and matriculated to Boston University. Stephenson did not exactly follow in his mother’s and father’s footsteps and go into engineering or chemistry, but he did not major in English or creative writing, nor does he have an M.F.A. from Iowa or one of the other traditional writing programs. Rather, Stephenson initially declared a course of study in physics but switched to geography. He began to write fiction while a student and graduated in 1981. In the four years after he graduated, he worked odd jobs but eventually achieved two milestones: Vintage published *The Big U* in 1984, and the next year he married the pediatrician Ellen Lackermann. They have since lived mainly in Seattle with their children.

As is often the case with popular writers, Stephenson’s work has been marked (and marketed) as genre fiction; in his case “science fiction” or “cyberpunk” are the most common labels, and he is often grouped with writers like Philip K. Dick, William Gibson, and Bruce Sterling, to name just three. This is not to say that “sci-fi” or “cyberpunk” are pejoratives; rather, such terms are often over used as well as over-simplified and reductive. Stephenson’s works are often firmly entrenched in technological innovation, but they also demonstrate the misleading and limiting nature of such labels. *Snow Crash* and *The Diamond Age* offer hope amid the dystopic futures, but it is often elusive and resides in his human characters, not in the technologies they create or rely on. And while such authors as Ray Bradbury and Margaret Atwood have rejected the label “science fiction” for “speculative fiction,” Stephenson maintains that he has always been a science fiction writer.¹¹ However, it is profitable to view Stephenson’s novels through the speculative fiction lens because, they “project worlds,” to employ Oedipa Maas’ phrase from Thomas Pynchon’s *The Crying of Lot-49* (1965), to force readers to question the stability of the contemporary social order, the use values and corresponding human costs associated with technological innovations, and/or history’s “progress.”

Like Gibson, Atwood, and other writers who create images of future dystopias or speculate on the future of technology, Stephenson certainly makes great use of computers and other inventions in his writings; however, it is a

mistake to think that he is only interested in stories about digitized people, places, or things. That said, it was the publication of *Snow Crash* in 1992 that first brought him commercial and critical success; it also marked the moment when he became firmly filed under cyberpunk. According to Bruce Sterling's "freeware" essay "Cyberpunk in the Nineties," before the term cyberpunk "acquired its handy label and its sinister rep, [it] was a generous, open-handed effort, very street-level and anarchic, with a do-it-yourself attitude, an ethos it shared with garage-band 70s punk music."ⁱⁱⁱ In other words, cyberpunk was a line of flight from established narrative styles, forms, and genres; like punk music, it broke out of the stagnation of 1970s culture. Of course, over the last 30 years, both cyberpunk fiction and punk music have been reterritorialized and are now largely part of the mainstream. No longer underground movements, both genres are accepted parts of the larger culture with established behaviors, characters, plots, themes, and fashions. As the Dead Kennedys sang in the 1980s, chain stores like Hot Topic now have "Anarchy for Sale" at the mall. Or, as Sterling says,

When "cyberpunk writers" began to attract real notoriety, the idea of cyberpunk principles, open and available to anyone, was lost in the murk. Cyberpunk was an instant cult, probably the very definition of a cult in modern SF. Even generational contemporaries, who sympathized with much *Cheap Truth* rhetoric, came to distrust the cult itself—simply because the Cyberpunks had become "genre gurus" themselves. (n.p.)^{iv}

The initial wave of cyberpunk was lost in the noise of fashion fads and commercialism, particularly the iconography of "mirrorshades" and black trench coats. Cyberpunk styles remains largely visually fixed in the culture, as the enormous box-office success of *The Matrix* series attests, through images of long black leather coats and mirrored sunglasses. In short, the term cyberpunk is reductive and vacuous, and according to Sterling, "'cyberpunk' simply means 'anything cyberpunks write.'" That covers a lot of ground and empties the term of much of its usefulness.

That history aside, *Snow Crash* is a novel about a 20-something, disaffected, racially mixed pizza "deliverator," hacker, and sword-fighter named Hiro Protagonist who lives in a U-Stor-It in Southern California. The novel traces his attempts to save the world through his programming acumen, cunning skills with samurai swords, and manipulations of the protocols of both real and virtual worlds. It is a violent novel, depicting a bleak society that has suffered a series of institutional crashes leaving governments, businesses, and lives fractured, decentralized, and franchised.^v As such, *Snow Crash* is in many ways the prototypical cyberpunk novel.

For Stephenson's works, cyberpunk is an easily used, but ultimately inadequate adjective that is employed to describe what he does; it does not seem to matter that in *The Diamond Age*, a technological elite social group has attempted to recreate the social and moral orders (and fashions) of Victorian England, or that in *Cryptonomicon*, Randy Waterhouse and his friends wear either blue jeans or custom-tailored business suits while using their computers for (largely) legitimate business, to say nothing of his Age of Reason *Baroque Cycle*. In short, for Sterling, Gibson, and Stephenson, the cyberpunk label appears difficult, if not impossible, to shed.^{vi} Further, when Hiro buys a top-of-the-line Yamaha motorcycle and dons a "full black coverall that swaddles everything from toes to neck in breathable, bulletproof fabric" or when he describes Y.T.'s fetishized thrasher outfits and weapons in *Snow Crash*, one could argue that Stephenson is parodying the many derivative cyberpunk protagonists modeled on Gibson's Case and Molly (*Snow Crash* 253).

On the other hand, because *Snow Crash* appeared almost a decade after *Neuromancer* (1984) and other founding cyberpunk texts, critics such as Pavel Frelik have called it "second-generation cyberpunk," arguing that Stephenson breathes fresh air into the genre:

His style of writing is distinguishably more sophisticated than that of other authors. . . . [*Snow Crash*] gave the whole cyberpunk literary community a sense of hope in the times of mindless copiers and identity crisis. This is also the reason for Stephenson's almost immediate inclusion in the canon and frequent comparisons to both Thomas Pynchon and William Gibson. (91).

In his creation of the Metaverse, a virtual reality far more negotiable and interesting than Gibson's cyberspace in *Neuromancer*, there are great affinities with cyberpunk. However, by coupling his technological visions with compelling plots that engage the economic and political forces that engineer the postindustrial, highly mediated worlds his characters *and readers* inhabit and create, Stephenson has re-engineered the contemporary American novel.

The Novels

Stephenson's first published work, the campus novel *The Big U*, was not a commercial success and was out of print for several years. Perennial reprinted it in 2001 to coincide with the paperback release of *Cryptonomicon*. While it is not as strong as the later novels, *The Big U* is perhaps not as bad as Stephenson now claims; however, Peter Sands' essay here is the first serious treatment of it. For examples of Stephenson's derision of the novel, one can go to the "Juvenilia" section of NealStephenson.com where he says, "*The Big U* is,

in many respects, a juvenile work, and should be understood as such.” On his older site on the Well, he says:

[V]irtually all of the first edition ended up getting pulped [creating] an unnatural scarcity of the printed book. . . . This scarcity caused the price of the first edition to become ridiculously high, and led to bootleg editions being posted on the Web. If the book were judged on its own intrinsic [sic] merits, it would not attract such a high price or engender such curiosity. *The Big U* is what it is: a first novel written in a hurry by a young man a long time ago.”^{vii}

While it may be “hurried,” *The Big U* is a useful introduction to some of the ideas, settings, and themes that reappeared and evolved in the succeeding works. Although the location of the titular university is never given, Stephenson seems to have incorporated many elements of Boston and Boston University into a Mid-Western college town like Ames or Urbana. Stephenson’s alma mater is known as “BU,” and one of the landmarks in the book, the huge neon “Big Wheel” near a mega-dorm known as “the Plex,” calls to mind the famous Citgo sign near the BU campus and Fenway Park.

With *The Big U*, Stephenson begins telling stories involving computer technology and artificial intelligence, role-playing, and collective identities as kinds of intelligences, patterns and concepts that we will see in the AI Librarian in *Snow Crash*; Chester, Avi, Andrew, and Randy’s love of role-playing games in *Cryptonomicon*; and the franchised, quasi-nation states or “burb-claves” in *Snow Crash* and the Neo-Victorians, CryptNet, the Drummers, and other “phyles” in *The Diamond Age*. So from this standpoint, *The Big U* is most useful for seeing the development of Stephenson’s voice and work. It is also not that bad a story, but certainly not as complex or satisfying as the later novels.

Boston also figures in two of Stephenson’s novels published since *The Big U*. *Zodiac: The Eco-Thriller* (1988) is set in and around the Charles River and Boston Harbor. While focused on the environmental damage that has been done to this watershed, the novel is more than just an attack on modern industry for the damages inflicted upon nature. It also marks Stephenson’s continued interest in non-traditional intelligences and networks of information that emerged in *The Big U* and extends into the much more successful—commercially and artistically—works, *Snow Crash* and *The Diamond Age*. Finally, Boston reappeared as the setting for the opening of *Quicksilver* (2003), the first volume of *The Baroque Cycle*; in this work, Enoch Root, a character introduced in *Cryptonomicon*, steps onto Boston Common at precisely 10:33:52 a.m. on 12 October 1713 just as an “executioner raises the noose above the woman’s head” (3). For some in the scene, this will hopefully be Boston’s last public execution and the end of the hysteria that has gripped the colony for twenty years. In other words, the struggle to end the witch trials is one place

where we can see the signs of modernization and rationalism's approach over, in this case, religious fundamentalism.

But since *Zodiac*, Stephenson's works interrogate the human condition as created or manipulated through scientific discovery and global modernization. In *Snow Crash*, authoritarian American institutions lie in tatters. The centralized governments have failed, and patchworks of franchised nation-states and suburban enclaves or "franchulates" and "burb-claves" have sprung up, offering limited protection, employment, and/or living spaces for their consumers and citizens, though the line differentiating such groups has become quite fuzzy. While they have not entirely "gone legit," groups like the Mafia, the Columbian drug cartels, and the Yakuza are no longer targeted by the authorities as the FBI and other agencies have themselves become such privately owned and operated franchises as "MetaCops Unlimited," "General Jim's Defense System," and "Admiral Bob's Global Security" and under no obligation to prosecute—their only obligation is to their shareholders. Stephenson's most commercially successful novel thoroughly questions the validity of social orders and ideas of social progress supported by unchecked and unregulated capitalism. But the novel remains popular largely because of the Metaverse, the massive online virtual reality used by the world's most powerful people; it remains a "very cool" idea, far more like what people have been trying to create than the grids Gibson describes in *Neuromancer*.

The Metaverse remains Stephenson's most famous creation, and interestingly, it began as a melding of video games and graphic novels Stephenson planned with artist Tony Sheeder. Apparently more work went into programming computers trying to make this work than writing the finished novel. As with the example of "Randy the Dwarf" cited earlier, we can see a little of Stephenson in his main character as we learn that as a young man, Hiro Protagonist "only understood one or two things in the whole world—samurai movies and the Macintosh—and he understood them far, far too well" (53). In the Acknowledgements, Stephenson describes how he also delved deep into the Mac as he and Sheeder tried to create the initial conception of *Snow Crash*:

I became intimately familiar with the inner workings of the Macintosh . . . [and] it became clear that the only way to make the Mac do things we needed it to do was to write a lot of custom image-processing software. I have probably spent more hours coding during the production of this work that I did actually writing it, even though it eventually turned away from the original graphic content, rendering most of that work useless from a practical viewpoint. (440)

While this work was "useless" as far as creating an innovative graphic novel, we can see elements of the character's history coming from Stephenson's hacking and programming.

Fourteen years after the novel was published, elements of the Metaverse have been realized in the real world. Many Massive Multiplayer Online Role Playing Games, or MMORPGs, including “World of Warcraft” and “Star Wars Galaxies,” have thousands of users developing characters, economies, and histories through on-line quests and adventures. While virtual spaces on the Metaverse’s scale and fully rendered avatars that look exactly like their users have not yet been realized, they are coming; many games and gaming and non-gaming websites have created avatars with customizable options including some basic emotions.^{viii} Of course, *Snow Crash* also shows that innovation is not only for the good; such paradigm shifts always unleash unexpected dangers as when Hiro realizes that the Metaverse has become as deadly as the dystopia of Reality. While Stephenson moves here from logical to, shall we say, wilder speculations in the two books set in the future, there is no question that *Snow Crash* and its follow-up *The Diamond Age* have set agendas for innovations that have only begun to be realized, as Gray Scott’s essay “Interdisciplinary Sage: Reading Stephenson Across the Curriculum” demonstrates.

The Diamond Age differs in several key ways from *Snow Crash*, but it is no less engaged with the dangers and benefits of future technological developments. *The Diamond Age*, like *Snow Crash* and many cyberpunk and science fiction novels, is set in a divided future, where technological, economic, linguistic, and social barriers separate the elite from the dispossessed. In Shanghai and other major waterfront cities in *The Diamond Age*, the powerful gather together in “phyles” that control Sources, essentially seawater mines that extract useful molecules and atoms directly from the ocean. Those without a phyle are known in the novel as “thetes,” and theirs is a desperate lot. Stephenson opens the novel with a thete named Bud, who we later learn is the father of the novel’s protagonist, Nell. Unlike Hiro and his associates, Nell is (initially) illiterate and spends most of the first part of the novel sequestered in the apartment she shares with her brother, Harv, and their mother, Tequila. Her life changes when Harv steals an interactive storybook called a “Primer” that teaches Nell to read, think, and defend herself, and that slowly raises her to maturity.

As the Metaverse remains the standout feature of *Snow Crash*, the possibilities held by nanotechnology applications like the Primer distinguish *The Diamond Age*. The Source is literally just the beginning of nanotech’s applications that appear to reach nearly all aspects of human life, and nanotechnology holds great promise for real-world innovations. We would all conceivably appreciate the extended life expectancies gained through the eradication of such “obsolete” causes of death as “cancer, scurvy, boiler-explosions, derailments, drive-by shootings, pogroms, blitzkriegs, mine shaft

collapses, ethnic cleansings, meltdowns, running with scissors, eating Drano, heating a cold house with charcoal briquets [sic], and being gored by oxen” (*Diamond Age* 42). However, people still die, and Stephenson imagines how people could use such technological innovations to invent new ways of killing each other: “[Nanotech] spawned concern that people from Phyle A might surreptitiously introduce a million lethal devices into the bodies of members of Phyle B, providing the technically sweetest possible twist on the trite, ancient dream of being able instantly to turn a whole society into gravy” (51). As with *Snow Crash*, Stephenson’s technological speculations foster explorations of the costs and benefits of modernization while at the same time engaging his readers’ imaginations. And like Kurt Vonnegut, an author with whom Stephenson has some unexplored affinities, he can be darkly funny.

In the fifth novel published under his own name, Stephenson engaged on a significantly different course than in *Snow Crash* and *The Diamond Age*, as *Cryptonomicon* is less speculative than historical fiction. Rather than imagining what dangers and amusements tomorrow’s technological innovations may bring, *Cryptonomicon* “retreats” from the mid and late 21st Century to the 1940s and 1990s to explore the roots and potential hazards of the Information Age. It is a long but remarkable extension of some of his common themes and widens his creative palate. That said, Stephenson’s character Enoch “the Red” Root, a magical character who has been alive since at least the Enlightenment and who dies and is resurrected during the novel, shows that Stephenson has not completely left the conventions or paradigms of the Science Fiction and Fantasy genres behind. *Cryptonomicon*’s scope is startling, moving deftly across China, Japan, the Philippines, Australia, Hawaii, and the Pacific Northwest to the East Coast of America, the United Kingdom, Scandinavia, and Central Europe while shifting between two time periods. Characters also witness the Hindenburg disaster, the attack on Pearl Harbor, and the Holocaust, consistently bringing human suffering to bear upon the technological innovations we may (want to) see as benign.

Like *The Diamond Age*, *Cryptonomicon* opens in Shanghai, but rather than at least a half-century from the present, it is set a half-century in the past, at exactly “1645 hours. Friday, the 28th of November 1941,” just before the Japanese invasion of the city and nine days before the attack on Pearl Harbor (1). There are of course hackers and warriors throughout *Cryptonomicon*; no Stephenson text lacks for them. The novel’s prologue features a United States Marine named Bobby Shaftoe riding on a truck careering through the streets of Shanghai. In succeeding sections, we are introduced to Bobby’s contemporary, Lawrence Waterhouse, a mathematician and code-breaker, and then his grandson Randy, a present-day hacker and IT entrepreneur. It may lack such a memorable technological innovation as the Metaverse or nanotechnology, but

parts of *Cryptonomicon*'s contemporary plotline details the attempts to construct a data haven, a secure site that could theoretically disable the ability of governments to track taxable income for corporations and individuals as well as foster the secure trading of information by anyone able to afford access to the haven. Stephenson's discussion of innovations that we take for granted today, such as digital memory, posits that the world of digital information networks resulted from the hot and cold wars in the second half of the 20th century, and these "encoded" roots may reappear in unexpected times and places. Demonstrating that Stephenson is not always completely prescient, data havens may have become obsolete before their use reached a tipping point because of the ever-increasing storage capabilities of flash drives and other easily transported, encryptable media.^{ix}

However, recent allegations that the NSA and other government agencies are tracking bank accounts and other online financial information without warrants proves that the "paranoia" demonstrated by Avi Halaby and other characters in *Cryptonomicon* may be warranted. While cryptography and cryptology are (to some) not as exciting as virtual realities or nanotechnology, Stephenson demonstrates that it is one of the defining protocols at work in American (and, by extension, Western) society. Further, through the World War Two plotlines, he shows how the making and breaking of secret codes precipitated today's economic, political, and industrial conditions. In other words, while the Manhattan Project and the development of nuclear and other weapons may have turned the tide in the war against fascism and totalitarianism, the breaking of such codes as the Nazi's Enigma and the Japanese's Purple were at least as important to the war and especially the post-war world. And for his most recent works, the three volume of *The Baroque Cycle*, Stephenson continues his exploration of, among seemingly dozens of other topics and themes, the use of encryption techniques to hide and exploit information in war, commerce, and science.

Quicksilver: Volume One of the Baroque Cycle, was published in September 2003; the second and third volumes, *The Confusion* and *The System of the World*, were published in April and October of 2004, respectively. Each novel is nearly as long as *Cryptonomicon* and includes detailed maps of many of the settings; *Quicksilver* also includes the family trees of the Houses of Stuart, Orange-Nassau, Bourbon, Welf, and Hohenzollern, as well as a Dramatis Personae noting fictional and historical characters. The project is immense in scope and ambition; there can be no claims of incompleteness against the *Cycle*. Thus far, it stands as Stephenson's grandest achievement, though one could argue that *Snow Crash* will likely remain the most accessible and taught text, much in the way that *The Crying of Lot-49* remains Pynchon's most taught work

despite the greater achievements and reputation of *Gravity's Rainbow* (1973) or *Mason & Dixon* (1997).

The *Cycle* opens in 1713 with a state-of-the-art transfer of information: Enoch Root has carried a letter across Europe and the Atlantic to Colonial Boston in hopes of delivering it to Daniel Waterhouse. The letter was written by Princess Caroline of Hanover nearly a year earlier and urges Daniel to return to Europe and mend the rift between his old friends Sir Isaac Newton and Gottfried von Leibniz. While his readers may not be able to conceive of non-instantaneous communication, Stephenson is able to illustrate that the timely exchange of information was no less a part of Enlightenment life than today. Further, the novel examines the Age of Reason origins of many economic and state protocols that we take for granted today including the exchange of stock, laws of credit, and solid currencies that were in large part created by the kinds of people, if not the actual historical figures, who appear in *The Baroque Cycle*.

At the same time, Stephenson also demonstrates that as the scientific and economic revolutions that essentially established Western modernity were being unleashed by savants like Leibniz and Newton (and Christopher Wren, Robert Hooke, and Christiaan Huygens among others who appear in the *Cycle*), there were also forces battling for political control of Europe and the new colonies across the New World, Africa, and Asia. For monarchs and other leaders like Louis XIV, William of Orange, and Peter the Great who appear in the *Cycle*, such natural philosophers as Newton and Leibniz and their works were only tools of state, to be used when deemed useful, but otherwise largely ignored. The creation of new ideas, concepts, or technologies can unleash terrors that must be met by those Stephenson identifies as “Athenians:” the Waterhouses and Shaftoes, and Hiro, Nell, and Hackworth. In such moments, modernity’s progress can halt or continue, be shattered or extend in new and interesting ways.

In the end, the contributors hope that all of the essays in this collection will open dialogue on the works and give readers a richer reading experience, teachers additional sources and ideas for their classrooms, and critics further contexts useful for pushing forward Stephenson studies. I certainly hope that Louisville marked the first series of panels dedicated to Stephenson and that more scholars examine his works in the larger contexts of American literature.

Works Cited

Frelik, Pavel. “Return from the Implants: Cyberpunk’s Schizophrenic Futures.” in Kraus, Elisabeth and Carolin Auer, eds. *Simulacrum America: The*

- USA and the Popular Media*. Rochester, NY: Camden House, 2000. 87-94.
- Pynchon, Thomas. *The Crying of Lot-49*. 1965. New York: Harper and Row, 1990.
- Stephenson, Neal. *Cryptonomicon*. New York: Avon, 1999.
- . *The Diamond Age, or A Young Lady's Illustrated Primer*. 1995. New York: Bantam Books, 2000.
- . *In the Beginning ... Was the Command Line*. New York: Avon, 1999.
- . "Juvenilia." 26 July 2006. <<http://www.nealstephenson.com>>.
- . *Snow Crash*. 1992. New York: Bantam Spectra, 2000.
- . *Quicksilver: Volume One of the Baroque Cycle*. New York: William Morrow, 2003.
- Sterling, Bruce. "Cyberpunk in the Nineties." 26 July 2006. <http://lib.ru/STERLINGB/interzone.txt>.

Notes

ⁱ The phrase "relentlessly loud" comes from the "About the Author" blurb in *Snow Crash*; one could make the argument that it describes Stephenson's prose style in many sections of his work, though Neal appears to be mortified by the blurb—see interview below. In particular, his openings often throw readers into a maelstrom of ideas that the remainder of the work relentlessly interrogates and explores.

ⁱⁱ See Marleen S. Barr's "Introduction: Textism—An Emancipation Proclamation" (*PMLA*. 119.3 (May 2004): 429-42) for a recent discussion of the field of science fiction studies and the reluctance of many scholars and writers of works that fit the genre of SF to take it seriously.

ⁱⁱⁱ Sterling's essay appears on many websites and is generally marked "not for commercial distribution." As with open-source software, many early cyberpunk writers gave away their works; there are many essays such as "Cyberpunk in the Nineties" that exist online in efforts to make such information freely available to as many people as possible.

^{iv} "Cyberpunk's one-page propaganda organ, *Cheap Truth* was given away free to anyone who asked for it" (Sterling n.p.). This 'zine was "killed off," Sterling reports, by its creators in 1986.

^v The first editions of *Snow Crash* began with three definitions: "snow," "crash," and "virus." The definition of crash is drawn from *The American Heritage Dictionary* and reads, "v. ... —intr. ... 5. To fail suddenly, as a business or an economy." This meaning

is used to establish the mood and circumstances of Hiro and Y.T.'s present. Strangely, these definitions have been removed from recent editions, a grave loss.

^{vi} As Sterling says in “Cyberpunk in the Nineties,” “the dreaded C-Word will surely be chiselled [sic] into our . . . tombstones.”

^{vii} Neal's site on the Well, <www.well.com/user/Neal>, is out of date, but it does have some information that has not been ported to <www.NealStephenson.com>.

^{viii} For example, some gambling sites, capitalizing on poker's recent popularity, have been creating look-alike avatars, as yet not fully expressive, for their professionals and awarding similar avatars to successful amateurs; see <www.FullTiltPoker.com> for example. The avatar economy based upon mass-produced “Brandies and Clints” in *Snow Crash* may not be far behind.

^{ix} As of this writing, a data haven does exist in the sovereign principality of “Sealand” located on an abandoned oilrig in the North Sea; see <www.sealandgov.com>. However, in June of 2006, Sealand suffered a devastating fire; it remains to be seen if it will survive. The company that created the data haven is called “Havenco” and their web-address is <www.havenco.com>.

CHAPTER ONE

INTERDISCIPLINARY SAGE: READING STEPHENSON ACROSS THE CURRICULUM

GRAY SCOTT

The question I will attempt to answer here is simple and relatively unambitious: How do economists, geographers, molecular scientists, engineers, and other non-literary scholars or specialists respond to the writing of Neal Stephenson in their own work? Simple though it may be, it is not an idle question. The fate of a literary work is necessarily tied to the ways that readers use it. When imagining such readers, it is easy to focus on the casual fan, the literary scholar, or the cultural critic. But stakeholders in the fields, industries, and disciplines under discussion are also a key part of the audience, and the ways that they react to or use a literary work can be seen as an accidental, but important, type of literary criticism. Such a study seems particularly appropriate to Stephenson, whose novels keep shifting the cyberpunk paradigm by borrowing from diverse fields.

The paper that follows belongs, then, to the same general phylum as a literature review—except that, rather than focus on what has been said about Stephenson by literary and cultural critics, I have focused on references in unexpected places. For example:

- When a geographer recommends making Stephenson's *The Diamond Age: Or, a Young Lady's Illustrated Primer* a key text in a graduate seminar (Wall 389-391),
- Or when a past director of the Central Intelligence Agency spends part of a speech talking about *Snow Crash* (Derian para. 38),
- Or when a hedge fund guru names Stephenson's *Quicksilver* the best business book of the year (Kessler, quoted. in Budman 70).

In many cases, scholars and other experts seem to be drawing on Stephenson, not for the usual literary allusions or critical ammunition, but for ideas, insights,

foresight, and inspiration. If so, it is a trend worth describing. This is, however, merely an exploratory survey. It will be light on theory and other sorts of literary review, to afford more space for cataloguing of Stephenson usages. I do not claim that this catalogue of uses is comprehensive or complete—merely that it is indicative. I have organized my findings by discipline. Stephenson’s treatment by the nanotech and genetics crowd provides us with a nice baseline for comparison with other fields, so I will start there.

Small-Scale Fields

Along with K. Eric Drexler’s *Engines of Creation* (1986)—a work of non-fiction that has helped to rally support for nanotechnology research by describing its promises—Stephenson’s *The Diamond Age* appears to be one of the more reliably cited sources regarding untapped small-scale possibilities. The novel paints a sometimes stark, sometimes inspirational picture of a future in which molecular engineering has made diamondoid construction commonplace. Just as mastery of stone, iron, and bronze led to their respective ages, so does mastery of the carbon atom’s diamond configuration. With its careful explorations of social and technical trends (particularly nanotechnology) taken to extremes, the novel seems to have attracted attention from experts with their eyes on the horizon.

It would be a mistake, though, to assume from the above comments that discussions of the novel abound in technical or experimental reports. The novel is, to be sure, cited in these genres, but seldom ostentatiously. When novels are invoked in technical literature, the usual approach is to make a quick reference to possibilities hitherto unexplored in the real world, with a footnote or endnote that lists some appropriate novel, and this is essentially what we see with Stephenson’s *The Diamond Age*. For instance, chemists Michael Sailor and Jamie Link describe three modes of mobility for nano-sized devices in an article on smart dust. The first of these modes is autonomous motion. The authors note that while “there are many examples from cellular biology, examples of autonomous motion of artificial nanostructures tend to be found only in the science fiction literature at present,” a comment for which the endnotes obligingly list *Fantastic Voyage* (1966), *The Diamond Age*, Michael Crichton’s *Prey* (2002)—and *The Cat in the Hat* (1957) (Sailor and Link 1380).¹ Like most science-fiction novels in most technical reports, Stephenson’s earns a quick tip-of-the-hat in an endnote, sans elaboration.

The practice is, of course, completely understandable, though not for the reasons one might initially suspect (say, that science journals are too stuffy and serious to bother with novels). Novel citations, though uncommon, are frequent enough in technical literature that a bias against fiction is a dubious

explanation. Indeed, because space is at a premium in such reports, most *nonfiction* sources receive a similar treatment. Furthermore, experimental and technical research reports are, rhetorically speaking, *forensic* documents, designed to establish a point of researched or laboratory fact. Because of this, they dwell primarily in the present and immediate past. Not belonging to the *epideictic* or *deliberative* branches of rhetoric, they have little interest in discussing a text that deals with future possibilities, except perhaps in conclusion sections, where ramifications of the just-reported research are briefly touched upon. In short, the treatment of science-fiction works described above should not be taken as a slight on the genre, or even as a sign of embarrassment. In Sailor and Link's article, for instance, the cited science fiction works play an important if subdued and fleeting role: They describe points on a map of progress, points we have not yet reached, but which, according to the context of the citation, are viable, anticipated points nonetheless. However, since we have not yet reached them, they merit little discussion in an article about research that *has* been completed. For the most part, sustained discussion of future possibilities, or of literary inspiration, belongs not in the experimental or research report but in other scientific genres.

Nevertheless, there are signs that those who walk in technical circles find Stephenson unusually interesting, if one looks to oral presentations and organizational Web sites grappling with small-scale technology. For instance, erstwhile computer science professor and Microsoft researcher Turner Whitted includes not one but two Stephenson allusions in the title of a talk recently delivered at the Symposium on Information Processing in Sensor Networks. The title of his talk, "Snow Crashing the Diamond Age: Mobile Devices meet Sensor Networks," invokes two of Stephenson's better-known cyberpunk novels: *Snow Crash* and *The Diamond Age*. Their casual use in the title suggests that the writer feels safe assuming most audience members will be at least passingly familiar with Stephenson's work, implying that Stephenson is probably widely read in the field, and discussed enough that mutual awareness of that familiarity has set in. Moreover, the fact that a professional feels comfortable invoking them in a title, and having his book judged by that cover, hints that perhaps Stephenson's work is taken at least somewhat seriously. This interpretation might seem to be a stretch, if one imagines that references to non-serious works like *Flash Gordon* or *Star Wars* might just as easily be made in a conference proceeding without observers necessarily assuming anything about the speaker's sensibilities. But in many ways non-serious, pulp works are safer to invoke than works like *Prey* and *The Diamond Age*, which clearly take their observations seriously. If a climatologist makes headline reference to Crichton's environmentally skeptical novel *State of Fear* (2004) without clearly setting up the novel as a target for rebuttal, it will not be terribly surprising if

members of the audience assume he agrees with Crichton's argument. Similarly, to invoke the seemingly authoritative *Diamond Age* is likely to be taken as tantamount to a kind of endorsement, and the speaker is likely to know this.

Some confirmation of this general endorsement appears in places like the Web pages of the Foresight Nanotechnology Institute (see, for instance, "Media Watch" para. 11). Another, better indicator appears in a *Science* article that describes Michael Crow—then Columbia University's science policy expert, now president of the nanotech-focused Arizona State University—asking an audience of researchers and government leaders at a nanotechnology conference, "How many of you have read *The Diamond Age*?" (Service 1524). Had the question pertained to something like Michael Crichton's *Prey*, which outlines a horrific scenario of nanotech run amok, the question might have been defensive, a set-up for a ritual debunking of fears and worries. Crow, however, claims his purpose in asking about *The Diamond Age* was to "encourage researchers to think about their unique position at the dawn of a field that most in the room agreed will be a force in the coming century" (1524). That is, although expressly not citing *The Diamond Age* as "prophecy" (1524), Crow sees the text as useful for launching discussions of the future roles of practitioners in the field.

Such discussions necessitate a shift in rhetorical branch, from the forensic to the deliberative, and this is where discussions of Stephenson's novels (while still on the subject of small-scale research) become interesting—on the peripheries of nanotechnology and genetics, where commentators lurk and the questions deal with policy, ethics, and philosophy. Some of these discussions, meanwhile, imply that Stephenson's writing is having a more pronounced effect on nanotech research than is indicated by overt citations. In one such instance, science philosopher Joachim Schummer argues that nanotech research is presently *multidisciplinary*, rather than *interdisciplinary*. Nanotech researchers in fields as diverse as chemistry, physics, and engineering are using incompatible terms, definitions, and paradigms, and thus are not as well equipped to collaborate as practitioners might like. Schummer cites, by way of example, the mechanical paradigm invoked by Drexler to describe atomic manipulation. Drexler posits a "universal assembler," a paradigm derived from mechanical engineering, where precision manufacturing is the norm. Stephenson, however, assigns a "matter compiler" to this same purpose, a paradigm which Schummer notes is drawn from computer science (19). Schummer suggests that these and other paradigms are not always compatible. One result of this paradigm-mixing is that nanotech research is as balkanized and insular as the American landscape in *Snow Crash*.

That Stephenson's paradigm warrants a mention in Schummer's discussion is intriguing, for it suggests that, whether researchers intend it to do so or not, or indicate it in citations, Stephenson's compiler paradigm might be haunting the ways that they are approaching the problem. Media scholar Robert Hassan makes a similar point when he argues—after noting the subtle effects of William Gibson and Stephenson on thinking about the World Wide Web and other new media—that “the use of conceptual categories emerging from sub-genres of literature as a way to articulate the new technotemporal ‘zeitgeist’ can skew our perspective if we take them too literally” (232).

Nevertheless, Schummer later argues, in a collaboration with Rosalyn Berne for the *Bulletin of Science, Technology and Society*, that science-fiction works like *The Diamond Age* are well-suited for teaching ethics to engineering students. The core of their argument is based on the long-standing, indeed ancient, use of literature to teach moral and ethical responsibility. Berne and Schummer contend that science fiction literature has the potential to serve the same purpose for future nanotechnology specialists that classic literature once served in the raising of aristocrats and princes. The key point to their argument, however (and what makes this particularly interesting to Stephenson readers) is that not just any science fiction work will do. Many seemingly eligible works, such as *Frankenstein* (1818, 1831), have an unfortunate side effect in that they serve to widen the two-cultures divide through arguments that are largely anti-science. These sorts of books are rejected by Berne and Schummer, who contend that stories used in teaching engineering ethics “need to raise moral issues that are considered both important and realistic, in the sense that they are sufficiently complex and that similar scientific and technological capacities are likely to come in the near future” (461-62). Carefully selected works of science fiction can engage tomorrow's engineers in discussions of future dilemmas that are both alien and plausible, hence instructive.ⁱⁱ Based on the principle of avoiding *Frankenstein*-type novels, Berne and Schummer end up drawing an interesting distinction between *The Diamond Age* and Michael Crichton's *Prey*. Even though the latter is clearly well researched and includes a bibliography lauded by technical professionals, and even though much of it is thereby plausible, it is passed over because the authors believe it is not subtle enough.ⁱⁱⁱ For the class in question, Berne and Schummer favor works that “bring to light the ambiguities and complexities of future social and moral life” (463).

The works that meet all the outlined criteria (ethical topics, plausible future, subtlety, complexity) are Flynn's *Nanotech Chronicles* (1991) and Stephenson's *The Diamond Age* (463-66). For the latter novel, Berne and Schummer make a number of points that, they suggest, might be suitable springboards for fruitful discussions, including the interesting observation that mastery over matter in the world described by the novel does not eliminate the

conflicts often ascribed to material shortages. That is, in *The Diamond Age*, we have eliminated resource shortages but *not* conflict, even though many discussions of politics and national interest hinge on the assumption that conflicts arise because of shortages. Clearly, in *The Diamond Age* universe, conflict emerges from something far more primal and less pragmatic. A second observation relates to privacy, as concerns over security (when threats can be microscopic) have trumped concerns over surveillance, so that when one visits even a close friend, one can expect to spend some time sitting in the foyer sipping tea while being discreetly checked out by security systems (466).

In another article, also on ethics, Berne compares the importance of works like *The Diamond Age* in discussions of nanotechnology to that of the film *Gattaca* in early genetics discussions, which were reportedly shaken up by the movie (“Tiny Ethics” 16). The comparison is an apt one. Nanotechnology has almost from inception faced ethical questions inherited from earlier controversies over genetic engineering, and discussions of social responsibility in the newer field frequently make reference to the earlier public relations disaster faced by those working in genetics. As James Wilsdon notes, molecular engineering and other nanoscale research are now under fire from the very organizations that rallied to oppose genetically modified food research more than a decade ago (17-18).

It is interesting, in light of this connection, to note that Stephenson, in an entirely different novel, appears to have contributed to the vocabulary of discourse surrounding scientific public-relations challenges. Nancy King, writing to the *Journal of Law, Medicine & Ethics*, credits her use of two terms to Stephenson’s early novel *Zodiac*, in which his eco-warrior narrator describes corporate publicity as either *mediagenic* or *mediapathic*. His goal for much of the book is to ensure that toxic waste abuses are prominently and gloriously mediapathic. The first of these words is, of course, not original to Stephenson. *Mediagenic* has been around since at least 1973, according to the OED. However, Stephenson seems to get some credit from writers and bloggers (see, for instance, message board comments by ahpook) for popularizing its use. *Mediapathic*, its antonym, appears to be a Stephensonian neologism, on the other hand. King, citing Stephenson, argues that gene transfer research has a high public profile “for both good and ill,” and is thus both mediagenic and mediapathic (383). This observation becomes the basis for her recommendations about oversight of the field.

Snow Crash and Computer Science

Stephenson’s contributions to vocabulary offer a fitting transition to a discussion of the ways computer scientists use his work, for it is difficult in

those pages to avoid references to the *Metaverse* or, particularly, *avatars*, both of which were introduced in Stephenson's most popular novel, *Snow Crash*. In computer science articles, first instances of these terms are often credited to Stephenson's hand, though Gerhard, Moore, and Hobbs do better digging than most. They note that use of the term *avatar* to indicate a virtual incarnation of a computer user dates back to the Habitat system of the 1980s, but give Stephenson credit for popularizing the term (457).

Regardless of the origins of his terminology, Stephenson's novel is obviously a celebrated one in the field, and his novel often appears to fire the imaginations of researchers. For instance, in an article simply titled "Avatars *a la* Snow Crash," Jan M. Allbeck and Norman I. Badler of the Center for Human Modeling and Simulation carefully deduce the required specs for Stephenson's avatars and plot our progress toward achieving them.

Glen D. Fraser, a software engineer, instead sets his sights on the central MacGuffin of *The Diamond Age*, a highly complex and interactive book called *The Primer*. He writes:

I'd love to see storytelling become more realtime, as it is when one makes up a story for a child. The author may *have* had an ending in mind before beginning to recount the story, but the storyteller is flexible enough to change it dynamically as the story unfolds and the child's responses give him new ideas. One of my favorite visions of a futuristic storytelling device of this kind is the 'Young Lady's Illustrated Primer,' described in Neal Stephenson's novel *The Diamond Age*. (An interesting and relevant note: even that technological marvel of a book—the Primer—required significant realtime human input on the storytelling end!) Working towards such a device that can entertain, teach and enrich people's lives is, to me, a very noble pursuit. (15-16)

To fully understand Fraser's reactions to the fictitious Primer, a quick plot summary is helpful. In the novel, a street urchin named Nell finds a prototype for an interactive Primer (designed by a nanotech engineer named John Percival Hackworth for his daughter, but lost in a mugging), which after bonding with her quickly deduces she is illiterate and starts to teach her to read. It later teaches her self-defense, programming, and problem solving, and in the process helps her to become quite self-reliant. Much of the instruction is in the form of interactive storytelling: Nell answers a question or makes a comment, and the story changes before her eyes, incorporating the new information.

As will be made clear below, Fraser is far from alone in drawing inspiration from the novel, but he does seem to be unusual in making the observation that the most effective version of the Primer—Nell's—has a very human element: the vocal, real-time performances of a remote actress named Miranda, who develops a very real maternal bond with the girl she is speaking to through the book. True, Miranda's lines are scripted, and the brains of the

operation are located in the Primer, not the actress. Yet Miranda wields great power in her delivery, even when it is not always intended.

In one pivotal scene, Nell reveals to the book that her mother's boyfriend, Burt, has beat her so badly that she is now peeing blood. Though she and Miranda have never met in person (indeed, Nell has little idea that there a real woman is supplying the voice of the book, and certainly little idea that the woman on the other end is developing real, maternal interest in her) Nell immediately notices that the book's voice has changed slightly: "After a long silence, the Primer began to speak again, but the lovely voice of the Vicky woman who told the story sounded thick and hoarse all of a sudden and would stumble in the middle of sentences" (200). The book, meanwhile, has decided that Nell is no longer safe at home. In the parallel story that the Primer is telling, about a princess also named Nell, a character suddenly urges the princess to escape while her captor is passed out drunk:

Miranda, sitting in her stage at the Parnasse, felt an overwhelming sense of relief as her next line appeared on the prompter. She took a deep breath before she delivered it, closed her eyes, settled her mind, tried to put herself there in the Dark Castle. She looked deep into Princess Nell's eyes and sold the line with every scrap of talent and technique she had. [...] *Please get out of there. Please run away. Get out of that chamber of horrors where you've been living, Nell, and get to an orphanage or a police station or something, and I will find you. No matter where you are, I'll find you.* (202, italics in original)

Setting aside Stephenson's clear conclusion that the Primer, though beneficial, performs best when it incorporates a human element, technical minds the world over are enthusiastically trying to do what Hackworth does: create interactive texts that can diagnose and respond to a child's real needs. Participants at the St. Thomas Common Sense Symposium on artificial intelligence (including artificial intelligence guru Marvin Minsky) report, in a discussion about the need to create AI systems capable of human-like "common sense," that:

Several of the participants felt that such a project would not receive substantial support unless it proposed an application that clearly would benefit much of the world. Not just an improvement to something existing, it would need to be one that could not be built without being capable of human-level commonsense reasoning.

After a good deal of argument, several participants converged upon a vision from *The Diamond Age*, a novel by Neil [sic] Stephenson. [...] This suggested that we could try to build a *personalized teaching machine* that would adapt itself to someone's particular circumstances, difficulties, and needs. The system would carry out a conversation with you, to help you understand a problem or achieve some goal. (122, emphasis in original)