

Science Fiction and Speculative Fiction

Challenging Genres

P. L. Thomas (Ed.)



SensePublishers

SCIENCE FICTION AND SPECULATIVE FICTION

Critical Literacy Teaching Series: Challenging Authors and Genre

Volume 3

Series Editor:

P. L. Thomas, Furman University, Greenville, USA

Editorial Board:

Leila Christenbury, *Virginia Commonwealth University*

Jeanne Gerlach, *University of Texas-Arlington*

Ken Lindblom, *Stony Brook University*

Renita Schmidt, *Furman University*

Karen Stein, *University of Rhode Island*

Shirley Steinberg, *McGill University, Montreal*

This series explores in separate volumes major authors and genres through a critical literacy lens that seeks to offer students opportunities as readers and writers to embrace and act upon their own empowerment. Each volume will challenge authors (along with examining authors that are themselves challenging) and genres as well as challenging norms and assumptions associated with those authors' works and genres themselves. Further, each volume will confront teachers, students, and scholars by exploring all texts as politically charged mediums of communication. The work of critical educators and scholars will guide each volume, including concerns about silenced voices and texts, marginalized people and perspectives, and normalized ways of being and teaching that ultimately dehumanize students and educators.

Science Fiction and Speculative Fiction

Challenging Genres

Edited by

P. L. Thomas

Furman University, Greenville, SC, USA



SENSE PUBLISHERS
ROTTERDAM / BOSTON / TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN 978-94-6209-378-2 (paperback)

ISBN 978-94-6209-379-9 (hardback)

ISBN 978-94-6209-380-5 (e-book)

Published by: Sense Publishers,
P.O. Box 21858, 3001 AW Rotterdam, The Netherlands
<https://www.sensepublishers.com/>

Cover original artwork “quarternickeldimepenny”, by Roymieco A. Carter

Printed on acid-free paper

All rights reserved © 2013 Sense Publishers

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

TABLE OF CONTENTS

Acknowledgements	vii
Introduction: Challenging Science Fiction and Speculative Fiction <i>P. L. Thomas</i>	1
1. A Case for SF and Speculative Fiction: An Introductory Consideration <i>P. L. Thomas</i>	15
2. SF and Speculative Novels: Confronting the Science and the Fiction <i>Michael Svec and Mike Winiski</i>	35
3. SF Novels and Sociological Experimentation: Examining Real World Dynamics through Imaginative Displacement <i>Aaron Passell</i>	59
4. “Peel[ing] apart Layers of Meaning” in SF Short Fiction: Inviting Students to Extrapolate on the Effects of Change <i>Jennifer Lyn Dorsey</i>	73
5. Reading Alien Suns: Using SF Film to Teach a Political Literacy of Possibility <i>John Hoben</i>	95
6. Singularity, Cyborgs, Drones, Replicants and Avatars: Coming to Terms with the Digital Self <i>Leila E. Villaverde and Roymieco A. Carter</i>	119
7. Troubling Notions of Reality in Caprica: Examining “Paradoxical States” of Being <i>Erin Brownlee Dell</i>	133
8. “I Try to Remember Who I Am and Who I Am Not”: The Subjugation of Nature and Women in The Hunger Games <i>Sean P. Connors</i>	145

TABLE OF CONTENTS

9. “It’s a Bird . . . It’s a Plane . . . It’s . . . a Comic Book in the Classroom?”: Truth: Red, White, and Black as Test Case for Teaching Superhero Comics <i>Sean P. Connors</i>	165
10. The Enduring Power of SF, Speculative and Dystopian Fiction: Final Thoughts <i>P. L. Thomas</i>	185
Author Biographies	217

ACKNOWLEDGEMENTS

This volume in the Critical Literacy Teaching Series: Challenging Authors and Genres represents yet another shifting journey for me as an author, scholar, and editor. *Science Fiction and Speculative Fiction* began as an authored volume by me, but I soon found myself seeking a collection of assorted voices on a range of genres dear to me as a reader and fan.

My first acknowledgement, then, must be Peter de Liefde, Founder and Owner of Sense Publishers. Peter allowed me to change direction after the volume was planned and has again offered outstanding support for this series and the pursuits of critical literacy and critical pedagogy.

Next, as editor of this volume, I am deeply indebted to the contributing authors in the pages that follow: Mike Svec, Mike Winiski, and Aaron Passell, colleagues of mine at Furman University; Jennifer Lyn Dorsey; John Hoben; Leila E. Villaverde; Roymieco A. Carter, who also provided the artwork for the cover; Erin Brownlee Dell; and Sean Connors, who served double-duty addressing young adult and comic books/graphic novels within the science fiction and speculative fiction genres. The range of expertise and fandom offered among this group has produced a volume that I believe is both unique to the field of SF scholarship and powerful in its confrontation of experiencing and teaching genre, medium, and form.

As I have acknowledged before and as I do in this volume, I am deeply indebted to my parents and my childhood, where I came to know the world of SF through the black and white movies on TV that my mother loved. I had the great fortune of being raised in a home that fed my voracious appetite for words, and although my parents never intended the outcome, their love, support, and trust in my intellect all led to my life as a critical academic and scholar—and to the reality that I still read and watch SF with the joy of child.

It would be remiss, then, not to thank Arthur C. Clarke and innumerable authors of my childhood and youth, and then Kurt Vonnegut and Margaret Atwood for maintaining my fascination by challenging my understanding of literature, fiction, SF, and scholarship. To all creators of SF in every medium and form possible, then, I offer my most sincere appreciation.

Finally, I must acknowledge Furman University for the outstanding professional environment that allows me to pursue a wide range of scholarly pursuits in a way that I determine. The conditions of my university commitments are truly yet another great fortune in my life.

P. L. THOMAS

INTRODUCTION

Challenging Science Fiction and Speculative Fiction

My childhood and adolescence can accurately be characterized as a menagerie of genre and media: From *Go, Dog, Go!* and *Green Eggs and Ham* to E.B. White's *Charlotte's Web* and *Stuart Little* to Saturday afternoons watching *The Fly* and *The Day the Earth Stood Still* as well as an assortment of classic horror films on *Shock Theater* to the 7,000 Marvel comics I read and collected throughout the 1970s and then to the novels of Arthur C. Clarke, Larry Niven and Jerry Pournelle, and Ray Bradbury.

My mother's fascination for books of all sorts and science fiction (SF) cannot be discounted in how this came to be. From her, I acquired my own naïve but budding love for a wide range of genres in an assortment of media. My life as a high school teacher of English (for 18 years in the rural town where I was born and raised) and then as a university professor and scholar in teacher education has pushed me to examine more closely the inherent allure of genre and medium as well as the complexity of the paradigms and drawing clear distinctions among either those genres or media (Thomas, 2010). With the clarity of hindsight, I see the inevitable transition from—in my life as a teen drawn to “other worlds” (Atwood, 2011, p. 1)—Arthur C. Clarke's *Childhood's End* and *Rendezvous with Rama* to—in my budding academic years as an undergraduate and early career teacher—William Faulkner's Yoknapatawpha County stretching over several novels that spoke to my shared Southern roots.

Eventually my literary life brought me to Kurt Vonnegut, an on-again, off-again fascination that finally clicked in adulthood and led to my writing a volume about Vonnegut's work and teaching his canon (Thomas, 2006) as well as becoming a sometimes Vonnegut scholar (Thomas, 2009). Well before he attained his cult-fame after the publication of *Slaughterhouse-Five*, Vonnegut (1965) confronted his initial and lasting association with science fiction:

Years ago I was working in Schenectady for General Electric, completely surrounded by machines and ideas for machines, so I wrote a novel about people and machines, and machines frequently got the best of it, as machines will. (It was called *Player Piano*) And I learned from the reviewers that I was a science-fiction writer.

I didn't know that. I supposed that I was writing a novel about life, about things I could not avoid seeing and hearing in Schenectady, a very real town, awkwardly set in the gruesome now. I have been a sore-headed occupant of a

file-drawer labeled “science-fiction” ever since, and I would like out, particularly since so many serious critics regularly mistake the drawer for a tall white fixture in a comfort station.

Vonnegut’s “sore-headed” response to the SF labeling highlights the hierarchy (fair or unfair) that exists for genres and media, but that distinction was absent in my childhood until I ran against it in my tenth-grade English class, taught by Lynn Harrill (who would become after my father the second most important man in my life as well as a mentor and friend [Thomas, 2003]).

After tolerating my SF obsession for much of the school year, Lynn imposed a wrong-headed mandate on me in my sophomore year when he banned my reading any more Clarke and SF, insisting that I turn my time to literary fiction (F. Scott Fitzgerald, Ernest Hemingway, Thomas Wolfe). In the years since, Lynn has admitted he was mostly misguided, but this moment in my experiences as a student and reader has paid inadvertent dividends to my life as a writer and scholar since it introduced me to a corrosive snobbery in society and education that I acknowledge and reject, what Kohn (2009) calls “negative learning.”

Vonnegut’s antagonistic and paradoxical relationship with SF lasted throughout his career. In *Man without a Country*, Vonnegut (2005) continues to wrestle with the inherent nature of technology in contemporary life and the responsibility of writers to address that reality: “I think that novels that leave out technology misrepresent life as badly as Victorians misrepresented life by leaving out sex” (p. 17). But by sticking to this simple truism, Vonnegut believed he was unduly labeled a SF writer, just for acknowledging technology, and then marginalized.

I also discovered a similar but more nuanced tension within a writer venturing into works labeled (or mislabeled, she contends) “science fiction”—Margaret Atwood (Thomas, 2007)—who has confronted SF and her works being labeled SF in essays (Atwood, 2005) and then a book on the genre (Atwood, 2011). While Vonnegut wrestled with his commitment to the conventions of SF and the realities of being labeled SF bringing dedicated fandom but scorn from literary critics, Atwood lends to the discussion a central thread I plan to weave through this volume on SF and speculative fiction.

Atwood’s being associated with SF began with *The Handmaid’s Tale* that, like Vonnegut’s *Player Piano*, received the SF label and led to her own argument against the classification: “So I think of *The Handmaid’s Tale* not as science fiction but as speculative fiction; and, more particularly, as that negative form of Utopian fiction that has come to be known as the Dystopia” (Atwood, 2005, p. 93). Also like Vonnegut, Atwood acknowledges the role of satire as well as literature intended as “dire warnings” (p. 94). With “Writing Utopia,” Atwood begins to wrestle with a complex interplay of genre considerations—SF, speculative fiction, Utopian fiction, Dystopian fiction—as well as writer intent—satire, “dire warnings.”

“Like *The Handmaid’s Tale*, *Oryx and Crake* is a speculative fiction, not a science fiction proper,” Atwood (2005) continues to argue when she returned to the genre, adding, “It contains no intergalactic space travel, no teleportation, no Martians” (p. 285). Atwood’s nuanced consideration of genre speaks to my own

evolving recognition that all sorts of texts (print, graphic, digital, film) work within genre conventions, against genre conventions, and by blending genre conventions in ways that remind me of the “other worlds” of my childhood books and even films such as Vincent Price’s *The Fly*, a powerful mix of horror and SF conventions (echoed masterfully in Ridley Scott’s 1979 *Alien*, starring Sigourney Weaver). In her discussion of *Oryx and Crake*, Atwood offers a framework for distinguishing genre, for her the blurred line between SF and speculative fiction:

As with *The Handmaid’s Tale*, [*Oryx and Crake*] invents nothing we haven’t already invented or started to invent. Every novel begins with a *what if* and then sets forth its axioms. The *what if* of *Oryx and Crake* is simply, *What if we continue down the road we’re already on? How slippery is the slope? What are our saving graces? Who’s got the will to stop us?* (pp. 285-286, emphasis in original)

The lineage leading to Atwood’s four novels (as of 2013) that contribute to some of her work being labeled SF and then her subsequent denial (and the controversy that creates) is examined by Atwood (2005) herself in “George Orwell: Some Personal Connections.” Reminding me of my own early reading of Clarke, Atwood read *1984* as an adolescent:

At the same time, I absorbed its two companions, Arthur Koestler’s *Darkness at Noon* and Aldous Huxley’s *Brave New World*. I was keen on all three of them, but I understood *Darkness at Noon* to be a tragedy about events that had already happened, and *Brave New World* to be a satirical comedy, with events that were unlikely to unfold in exactly that way....But *1984* struck me as more realistic, probably because Winston Smith was more like me...and who was silently at odds with the ideas and the manner of life proposed for him. (pp. 288-289)

This on-going and developing consideration of genre by Atwood, both in her fiction and her nonfiction, reveals her life as a young reader and her own journey with literature.

In the summer of 2011, I dove into novels written by Neil Gaiman, a writer whose work I had come to know and appreciate through his comic books and graphic novels (notably his *Sandman* series) as well as his blog and Twitter account. One thing I noticed was that his novel *American Gods* was identified by the publisher as SF. Once I read that work and then *Anansi Boys*, I was struck by my own struggle with classifying Gaiman’s work, a struggle I find compelling in Atwood (2011), who discusses how others tend to classify *The Handmaid’s Tale*, *Oryx and Crake*, and *The Year of the Flood* as SF:

Though sometimes I am not asked, but told: I am a silly nit or a snob or a genre traitor for dodging the term.... I didn’t really grasp what the term *science fiction* meant anymore. Is this term a corral with real fences that separate what is clearly “science fiction” from what is not, or is it merely a shelving aid, there to help workers in bookstores place the book in a semi-

accurate or at least lucrative way?...These seemed to me to be open questions.
(p. 2)

And it is here—genre and medium as “open questions”—that I want to focus this volume, as I did when considering comics and graphic novels (Thomas, 2010). Instead of defining and classifying a variety of texts (print, print and graphics, film, digital) as SF or speculative fiction (I still feel compelled to classify *American Gods* and *Anansi Boys* as fantasy or create some new terminology such as “contemporary mythology”), a variety of authors dive into genre and medium throughout this volume as a vibrant but never-ending quest to confront, challenge, and embrace the shifting conventions of SF and speculative fiction, here as readers, fans, and scholars but also in parallel ways to Vonnegut and Atwood as artists. This, then, will be a journey filled with tension, contradictions, false starts, and possibly more questions raised than answered.

* * *

The lens for this discussion of SF and speculative fiction, as offered in my volume on comics and graphic novels (Thomas, 2010), is critical pedagogy (Kincheloe, 2005a, 2005b) and critical literacy. SF and speculative fiction are ideal genres for confronting the nature of text, genre, medium, and reading, providing students and teachers rich and complex avenues for reading and rereading the world, writing and rewriting the world as well as creating classrooms that honor teacher/student and student/teacher dynamics (Freire, 1993, 1998, 2005).

In discussions of teaching, and particularly in discussions of what is often deemed *basic* education (such as literacy), we tend to focus on the *what*'s: What texts or what teaching strategies or what content? But in this volume, we are asking that readers step back further than the *what*'s and consider the *why*'s: Why are we engaging with texts? Why are some texts allowed in formal education settings and others excluded? Why do we perpetuate a narrow view of “text,” “medium,” “reading,” and “genre”? Of course, there are many more *why*'s, but in this introduction, I want to pull us back so that throughout the coming chapters we remain focused on those *why*'s as we do examine the *what*'s.

As I noted in my comics/graphic novels volume:

“Doctrinaire or explicitly revolutionary literature is not needed when literary works of art have the capacity to move readers to imagine alternative ways of being alive,” Greene (1995) notes, shifting our criteria for selecting text from some imagined qualities within the text to the impact that text has on the reader. Like Rosenblatt (1995), Greene is expanding our views of the reader-writer-text dynamic. (Thomas, 2010, p. xii)

Similar to comics/graphic novels, SF and speculative fiction are genres that “move readers to imagine alternative ways of being alive”—notably in that they have thrived in a wide range of media from traditional text-only works to TV and movies to comics/graphic novels.

The canon of works endorsed and even allowed in the English classrooms—recall my own experiences with Mr. Harrill during my sophomore year of high

school as well as Vonnegut's feelings of being marginalized—is a powerful and corrosive dynamic:

As Greene (1995) continues, she clarifies that authoritarian views of genre, text, and literature impose onto students implicit messages *that their own worldviews do not matter, at best, or are wrong, at worst* [emphasis added]. Part of Greene's own "begin[ning] again" involved that realization: "I have not easily come to terms with the ways in which education, too often following the lines of class, gender, and race, permits and forbids the expression of different people's experiences" (p. 110) [W]hen I had committed myself fully to the world of reading, drawing from, and collecting comics, I never saw that rich literacy experience as something that mattered in school. This chasm between the literacy lives of our students and the normalized literacy of school is a profound failure of schooling. (Thomas, 2010, p. xiii)

To recognize, embrace, and explore the SF and speculative texts that flourish in our culture and in the lives of students is to open up the possibilities of text and to honor the possibilities of other ways of knowing, most notably the other ways of knowing that our students bring to their learning:

Many of the alienated or marginalized are made to feel distrustful of their own voices, their own ways of making sense, yet they are not provided alternatives that allow them to tell their stories or shape their narratives or ground new learning in what they already know. The favored ones, in contrast, seldom question the language of dominance or efficiency or efficacy in which they are reared, although they may seek out discourses more appropriate for a shared young culture or for moments of rebellion or adolescent discontent. (Greene, p. 111)

The life and career of Vonnegut (Shields, 2011; Sumner, 2011) reveal the power of being marginalized on an influential and popular writer; as teachers, we must consider how our choices and biases instill that same distrust in our own students, effectively silencing them.

This volume's consideration of SF and speculative fiction, then, is not intended to suggest that SF and speculative fiction are somehow superior to other genres, but to advocate for expanding what texts we consider, how we examine texts, and what conclusions we reach (tentatively) *with our students* by viewing texts as a way to knowing, not a fixed goal to be achieved. As well, this volume seeks to infuse further into the classroom both critical pedagogy and critical literacy as necessary for education as empowerment, individual autonomy, community, and social responsibility.

SF, SPECULATIVE FICTION, AND HONORING LITERACY

As I noted above, I can clearly trace my literary and scholarly life back to SF roots, a vibrant life that was nurtured by a blend of genres and media that allowed a

Southern young man from a working-class family excel throughout formal schooling. My literary experiences as a boy and young man were primarily steeped in the SF world, notably moments such as watching *The Andromeda Strain* (1971) run on TV after its theatrical life, and I am convinced that SF/speculative fiction are powerful genres for building critical literacy, *but I also believe that a person's being deeply engaged with a genre or series is ultimately what builds the foundation for empowering literacy.*

In other words, this volume is in many ways about how and why readers (or viewers) fall in love with particular genres or series (whether that be novels, as with the *Hunger Games* or *Twilight* series for young adults, or TV and movies series, as with *Star Wars* or *Star Trek*, or cable phenomena such as *True Blood* and *Game of Thrones*). My serial fascination manifested itself in *Shock Theater*, collecting and reading Marvel comics, and devouring SF novels from Clarke, Bradbury, and Niven/Pournelle. While I believe SF has a powerful, although not unique, quality (or set of qualities) that help trigger and feed the serial loyalty found in many children, young adults, and adults who are highly literate, I recognize that other genres (fantasy, romance, horror, detective) have a parallel power and thus am arguing that we reconsider the value of genre fiction, which, as Vonnegut lamented, often is unduly and routinely marginalized.

SF, like fantasy, often builds and develops entire and seemingly new worlds (sometimes as thin disguises for our own world and often genuinely speculative or uniquely alternative existences) with characters that exist in extended narratives that readers and viewers can come to know and love (or hate). I can now see that my serial fascination embedded in watching TV's *Star Trek* or collecting Spider-Man comics blurred into my love for J. D. Salinger's Glass family spanning the few works Salinger offered this world. The fictional "other worlds"—whether SF, speculative, or literary—always have spoken to me as *real* and *True*.

And it is here that I connect SF and speculative fiction with my educational foundations of critical pedagogy and critical literacy. Critical pedagogy views the content of education as a mechanism for unmasking the world, not as a goal of teaching. In other words, I see SF novels, for example, as an ideal format for seeking the value in the novel for the novel's sake as well as a window into students reading/re-reading the world and writing/re-writing the world. As we sit in a classroom with texts of all kinds, the teacher seeks to be the teacher-student while the student is a student-teacher.

SF and speculative fiction, then, are not here being suggested as something teachers assign, but possibilities that teachers allow students to explore and even encourage students to explore. Critical literacy is both a goal of bringing text into the classroom and a commitment to honoring a students' autonomy and the dignity of engaging with a wide variety of texts for a wide variety of purposes (including that a person simply loves the experience).

The concept of *reading* becomes a problem here. Some (if not many) people conflate *pronunciation* with *reading*. Some do argue to move beyond mere decoding, though, and stress that reading is comprehension. Both of these positions ultimately fail text and students, however. If readers merely decode (the ability to

pronounce all the words), but have no sense of what the meaning of those sounds are, then of course, the *reading* has little empowering qualities (in fact, that some children can decode often masks that they are not truly engaging fully with text and the *appearance of reading* can then work against their autonomy). To then push a student to mere comprehension (the ability to paraphrase accurately what the text presents) is not enough since that does not address how text positions a reader, what credibility lies within that text, and a whole range of contexts and assumptions that must be exposed and confronted for readers to be autonomous and empowered.

The chapters in this volume seek to offering SF and speculative fiction in a wide variety of media as challenging texts as well as challenging the genres and media in order to honor critical literacy and human agency. The role and purposes of texts are combined with re-thinking the role and purposes of teachers and students.

SF AND SPECULATIVE FICTION: “A HARD AND FAST DEFINITION?”

Atwood (2011) found herself in the middle of a debate over not just what qualifies a text or medium as SF, or some other genre similar to SF, but by addressing those defining qualities, the broader debate over the quality inherent in genres. For the *New Scientist*, Atwood explained her own process as it stands against people with “a hard and fast definition of ‘science fiction,’” adding:

Here I myself would include such items as Body Snatchers—if of extraterrestrial rather than folklore provenance—and Pod People, and heads growing out of your armpits, though I’d exclude common and garden-variety devils, and demonic possession, and also vampires and werewolves, which have literary ancestries and categories all their own. (p. 3)

Part of understanding and even defining SF includes the details that any audience associates with that genre, and why. Atwood admits that SF can be identified by how the medium is presented, such as a book cover, as anything else: “Thus: looks like science fiction, has the tastes of science fiction—it IS science fiction!” (p. 3).

Eventually, Atwood’s struggle to define SF and her own works’ relation to the genre built to a peak that included Ursula K. Le Guin’s reviews of Atwood’s *Oryx and Crake* and *The Year of the Flood*. Le Guin, a major writer of SF and fantasy, believes Atwood’s works are SF because they blend an imaginative look at worlds that might be as well as satirizing the world that has been and is, and Le Guin also bristles as Atwood’s arguments against the SF label: “This arbitrarily restrictive definition seems designed to protect her novels from being relegated to a genre still shunned by hidebound readers, reviewers and prize-awards. She doesn’t want the literary bigots to shove her into the literary ghetto” (Atwood, 2011, pp. 5-6).

Le Guin’s argument pushed Atwood (2011) to examine the nuances of SF, speculative fiction, and fantasy as well as Bruce Sterling’s term “slipstream”:

In short, what Le Guin means by “science fiction” is what I mean by “speculative fiction,” and what she means by “fantasy” would include some of what I mean by “science fiction.” So that clears all up, more or less. When

it comes to genres, the borders are increasingly undefined, and things slip back and forth across them with insouciance. (p. 7)

Atwood is not only confronting the complexity of defining any genre, but also recognizing that the term “genre” itself is perplexing, noting Sterling’s consideration of “genre” and “category” (much like the debates and confusions surround the status of comic books as medium or genre [Thomas, 2010]).

Ultimately, Atwood (2011) returns to the source of the title of her book, “other worlds”: “in another time, in another dimension, through a doorway into the spirit world, or on the other side of the threshold that divides the known from the unknown” (p. 8). SF and speculative fiction, or at least works that appear to fall within one genre/category or the other, allow students and teachers to apply what they know about text, genre, medium, and reading while also challenging that awareness. It is the same tension that I felt over Gaiman’s *American Gods* or my recent fascination with the HBO series *True Blood* (I’ve never been a real horror or vampire fan, but the serialization and dark humor clearly overlap the essence of my love for SF).

* * *

Sterling (2011) returned in 1999 to his category, “slipstream,” coined in the 1980s, just before Atwood published *The Handmaid’s Tale* and well before Atwood and Le Guin entered into a literary argument over SF. While Sterling notes that his term appears never to have gained a hold, especially in marketing and publishing (recall the publisher’s labeling *American Gods* as SF), he also recognizes some of the complexity with coherence within genres:

There would be a certain amount of solidarity within the genre; they would have a generic sensibility. But they clearly don’t. Trying to get slipstream writers together is like herding cats. I don’t think they have a temperament with which they can unite.

So is coherence, or some sort of official organization necessary for a genre to be defined and even valued? Maybe or maybe not, but Sterling does equate genre with the organic needs of a contemporary time:

But the reason I think it’s [“slipstream” as a possible category/genre] still interesting, and is still compelling public attention years later, is that I think our society *has room* [emphasis in original] for a new genre. A genre arises out of some deeper social need; a genre is not some independent floating construct. Genres gratify people, they gratify a particular mindset. They gratify a cultural sensibility, and there is a cultural sensibility that is present today that would like to have a literature of its own and just can’t quite get it together to create one. This would be a nonrealistic genre of a postmodern sensibility. But since it doesn’t exist, I think slipstream is probably best defined by talking about things that it isn’t.

Regardless of the tension between and among genres felt by authors, readers, teachers, students, and critics, Sterling (2011) identifies the power of classification

or at least the power of debating these distinctions and the hegemony embedded in such debates. And with the organic nature of genre in mind, we have organized the following chapters around broad categories that support and inform a consideration and confrontation of SF and speculative fiction within a variety of media and forms.

In Chapter One, “A Case for SF and Speculative Fiction: An Introductory Consideration,” Thomas details and rejects the traditional and lingering reality that SF as a genre has often been marginalized, with a few works and writers allowed into the official canon, almost begrudgingly—Aldous Huxley, George Orwell, Kurt Vonnegut, Margaret Atwood. But those SF works tend to be embraced when the writers are also considered literary, leaving works and writers dedicated exclusively to SF to a second-class status. This chapter examines what constitutes SF as a genre and discusses the complex debate surrounding that classification, building on Atwood’s (2011) arguments about SF, speculative fiction, and dystopian fiction. This chapter also introduces a consideration of SF/speculative fiction across several medium forms—novels, short stories, film, and graphic novels. The chapter includes an annotated listed of resources that consider SF and speculative fiction in a variety of contexts including introductions to the genres; framing the genres against feminism, race, sexuality, and politics; placing the genres against other genres and media (young adult literature and comics/graphic novels); and highlighting key authors in the genres (Philip K. Dick, Ursula K. Le Guin).

Next, “SF and Speculative Novels: Confronting the Science and the Fiction,” Chapter Two, authored by science educators Michael Svec and Mike Winiski, discuss how they confronted the tensions between SF and science during a first-year seminar for college students focusing on Mars. Their argument is described in the chapter as follows:

As we move toward a pedagogical definition of SF, we are guided by the goals of providing students with the opportunity to develop both their sense of informed skepticism and wonder. Selecting SF only for its realistic portrayal limits the opportunity for students to explore the social, political, and ethical implications of the science that are so powerfully revealed through story. A focus on realism can also squelch the “what if?” questions which foster openness to new ideas and curiosity. On the other hand, stories that play too loose with the science diminish opportunities to teach its content and process. Our evolving scientific understanding over time complicates the mix.

Chapter Three, “SF Novels and Sociological Experimentation: Examining Real World Dynamics through Imaginative Displacement,” by sociologist Aaron Passell, argues that SF novels “pose sociological questions.” This chapter explores the dialogical relationship between SF and sociological speculation “because we cannot perform on real people the experiments that we can imagine.” Speculative topics include sex and gender, race and ethnicity, human evolution, and other themes and topics common within the field of sociology. The chapter

ends by offering a number of powerful pairings of specific SF novels and sociological considerations.

In Chapter Four, “‘Peel[ing] apart Layers of Meaning’ in SF Short Fiction: Inviting Students to Extrapolate on the Effects of Change,” doctoral student Jennifer Lyn Dorsey confesses that punk rock and SF helped shape her during adolescence, and then she argues how the two “offered something the rest of my life and education lacked. They asked questions.” Using the context of critical literacy and critical thinking, Dorsey explores SF short fiction, focusing first on a brief history of that intersection. She then deals with the ethical issues connected with technology as viewed through the lens of SF. Next, she examines questions around power and then SF’s powerful look at defining humanity—all through a variety of SF short fiction works.

Despite the best efforts of many scholars to trivialize SF film, in Chapter Five, “Reading Alien Suns: Using SF Film to Teach a Political Literacy of Possibility,” John Hoben argues that “SF film offers a model of public life as a web of unexplored possibility, and an anticipatory *space*, positioned between the human and the virtual.” Through a number of key SF films, Hoben deals with the connection between SF’s interest in self, time, and place as a parallel process to critical thinking, particularly as a goal of critical classrooms. This is followed by a discussion of traditional, behavioral education complicated by Stanley Kubric’s *Clockwork Orange*: “What would we do, Kubrick seems to be asking us, if we knew the future was a camp being prepared for us, and the momentum of the present pushed us along like some dark infernal train?”

Chapter Six, “Singularity, Cyborgs, Drones, Replicants and Avatars: Coming to Terms with the Digital Self,” by cultural scholar Leila E. Villaverde and artist-scholar Roymieco A. Carter, offers a direct challenge that “technology is the new opiate of the masses.” To make their case, Villaverde and Carter use several SF films—*The Island*, *Logan’s Run*, *Minority Report*, *Ghost in the Shell*, and *In Time*—as contemporary examples of key themes and topics related to cloning, reality, class, the body, work, time, and wealth as they intersect scarcity and fate. The discussion seeks critical literacy as a mechanism for rethinking the nature of curriculum and learning.

Erin Brownlee Dell in Chapter Seven, “Troubling Notions of Reality in *Caprica*: Examining ‘Paradoxical States’ of Being,” considers how simulation allows for multiple representations of reality so that any distinction is ultimately blurred and any one *true* reality questioned, building on philosopher Jean Baudrillard’s “paradoxical state.” This postmodern stance complicates perceptions of what is real, welcoming the chaos of uncertainty. Her chapter concentrates on SF in television since a “paradoxical state” of being frames much of the *Battlestar Galactica* series prequel *Caprica*. This prequel helps highlight that identity, technology, and reality exist in a state of flux, calling on viewers to reconsider what constitutes reality, the self, and human existence.

In Chapter Eight, “‘I Try to Remember Who I Am and Who I Am Not’: The Subjugation of Nature and Women Represented in *The Hunger Games*,” English education professor Sean Connors wades into the popularity and complexities

surrounding SF adolescent literature, Suzanne Collins's *The Hunger Games*, as a novel trilogy crossing over into mainstream adult pop culture and as a statement on empowered young women. Connors "advocate[s] reading [Katniss's] character as a metaphor for the damage that patriarchal institutions inflict on young females by inundating them with a steady stream of messages that function to actively limit the subject positions they recognize as available to them." Sections in the chapter consider young adult dystopian fiction as social criticism and ecofeminism literary criticism, building to an extended discussion of *The Hunger Games* as an argument for the power of both SF and young adult literature.

Connors, next in Chapter Nine, "'It's a Bird ... It's a Plane ... It's ... a Comic Book in the Classroom?': *Truth: Red, White, and Black* as Test Case for Teaching Superhero Comics," opens by acknowledging the powerful connection between SF, speculative fiction, and comic books. The pop culture icon, Superman, stands as a central image for the mix of genre and medium found in superhero comic books and narratives, including crime, horror, fantasy and—perhaps most famously—SF. This chapter situates speculative superhero comics and graphic novels as texts rich in possibilities for confronting how those text mirror and challenge cultural norms. Connors provides a brief overview of the history of comics and then focuses on the graphic novel *Truth* that began as a seven-issue comic book anchored by an African American super soldier within the Captain America narrative.

Thomas's Chapter Ten, "The Enduring Power of SF, Speculative and Dystopian Fiction: Final Thoughts," anchors this volume by outlining a series of public commentaries linking SF works with key social, political, and educational issues. This final section helps contextualize why and how SF remains a powerful and insightful genre that is enduring, a central characteristic often associated with literary texts held in greater esteem than SF.

* * *

In her father's cellar, Atwood (2011) read H. Rider Haggard's *She*: "I was a teenager, it was the 1950s, and *She* was just one of the many books in the cellar" (p. 106). While Haggard's novel from the 1890s fits well into the blur of genre that Atwood confronts, it is also important to recognize the context of her first reading:

I had no socio-cultural context for these books then—the British Empire was the pink part of the map, "imperialism and colonialism" had not yet acquired their special negative charge, and the accusation "sexist" was far in the future. Nor did I make any distinctions between great literature and any other kind. *I just liked reading.* (p. 106, emphasis added)

As a teen reader who loved to read, Atwood (2011) associated *She* of the novel with her reading Wonder Woman comics, and "[t]hen I graduated from high school and discovered good taste, and forgot for a while about *She*" (p. 109). And this is where I want to frame what the authors seek in the chapters to come—a balance between the naïve but passionate love of texts and the informed and critical challenging of text.

If awareness and problematizing "genre," "medium," "text," and "reading" destroy the naïve but passionate reader, then the acts of being a scholar and student

have the exact opposite effect that learning and scholarship should achieve. So it is cautiously that we move forward with a detailed consideration and confronting of science fiction and speculative fiction because the authors here, like Atwood (2011), found have found ourselves in love with the genres and media before we really understood what we had given our literary and scholarly hearts to.

CAVEATS, MOTIFS, AND ASSORTED THREADS

Let me pause here, before moving into the volume proper, to offer a clear set of statements that can help any readers of this volume understand for whom, why, and how we are proceeding in a volume purporting to examine and *challenge* a genre. In each chapter, these caveats, motifs, and assorted threads should hold the volume together as a tentative but cohesive whole:

- As an editor and chapter author, I am not a SF writer, scholar, or expert. I am a critical pedagogue (Kincheloe, 2005a, 2005b), a life-long SF and comic book fan as well as collector, and a part-time or tangential literary scholar (Kurt Vonnegut and Margaret Atwood, along with Barbara Kingsolver, Ralph Ellison, and the interplay of genre and medium in comic books and graphic novels) who has spent nearly three decades as a serious teacher of writing and literature at the high school, undergraduate, and graduate levels. As such, I remain more a *seeker* and a fan (Roberts, 2005) than authoritarian scholar on SF. If I make too many references to and spend too much time on Steven Soderbergh’s *Solaris* (2002), that may well rub some readers and scholars the wrong way, but it is no claim to the quality of the work as much as how that work has informed me in my journey with SF.
- Readers may wonder, ironically, what type of work this is as well as who the audience is, and therein lies a key aspect of this work. This volume is eclectic in its own genre and purpose(s) as it is part literary scholarship, part *fanfare* (as a bit of a pun), part pedagogical and methodological musing for teachers, and part advocacy for the appreciation of and value in SF and speculative fiction for readers/fans, teachers, scholars, and students. And the discourse as well as mode of discussion and argument blends a variety of styles that integrate the conventions of scholarship and academic writing with personal narrative.
- Scholarship on SF tends to offer stances on definitions, authoritative lists of authors and works, and nuanced commitments to terminology (“genre,” “medium”), but this volume is much more enamored with the arguments, the evolution, the journey with SF, speculative fiction, and the whole host of terms and concepts that accompany that journey—genre, medium, reading, text, Truth/truth. Thus, we are allowing ourselves to experiment and makes errors, recycle and confront again and again some of the issues that many scholars would declare “finished,” partly as naïve and evolving fans/scholars/teachers, and then partly to maintain the freshness of the questions for readers, students, and teachers all along the spectrum of expertise with SF and speculative fiction.

REFERENCES

- Agamben, G. (1998). *Homo sacer: Sovereign power and bare life*. Stanford, CA: Stanford University Press.
- Agamben, G. (2005). *State of exception*. Chicago: University of Chicago Press.
- Atwood, M. (2011). *In other worlds: SF and the human imagination*. New York: Nan A. Talese/Doubleday.
- Atwood, M. (2005). *Writing with intent: Essays, reviews, personal prose: 1983-2005*. New York: Carroll and Graf Publishers.
- Freire, P. (1993). *Pedagogy of the oppressed*. New York: Continuum.
- Freire, P. (1998). *Pedagogy of freedom: Ethics, democracy, and civic courage*. P. Clarke (Trans.). Lanham, MD: Rowman and Littlefield.
- Freire, P. (2005). *Teachers as cultural workers: Letters to those who dare to teach*. D. Macedo, D., Koike, & A., Oliveira (Trans.). Boulder, CO: Westview Press.
- Greene, M. (1995). *Releasing the imagination: Essays on education, the arts, and social change*. San Francisco: Jossey-Bass.
- Kincheloe, J. L. (2005a). *Critical constructivism primer*. New York: Peter Lang.
- Kincheloe, J. L. (2005b). *Critical pedagogy primer*. New York: Peter Lang.
- Kohn, A. (2009, September 16). The value of negative learning: How traditional education can produce nontraditional educators. *Education Week*. Retrieved from <http://www.alfiekohn.org/teaching/edweek/negativelearning.htm>
- Roberts, A. (2005). *The history of science fiction*. New York, NY: Palgrave Macmillan.
- Shields, C. J. (2011). *And so it goes: Kurt Vonnegut: A life*. New York: Henry Holt and Company.
- Sterling, B. (2011, March). Slipstream 2. *Science Fiction Studies* #113, 38(1). Retrieved from <http://www.depauw.edu/sfs/abstracts/a113.htm#sterling>
- Sumner, G. D. (2011). *Unstuck in time: A journey through Kurt Vonnegut's life and novels*. New York: Seven Stories.
- Thomas, P. L. (2003, November). A call to action. *English Journal*, 93(2), 67-69.
- Thomas, P. L. (2006). *Reading, learning, teaching Kurt Vonnegut*. New York: Peter Lang USA.
- Thomas, P. L. (2007). *Reading, learning, teaching Margaret Atwood*. New York: Peter Lang USA.
- Thomas, P. L. (2009). "No damn cat, and no damn cradle": The fundamental flaws in fundamentalism according to Vonnegut. In D. Simmons (Ed.), *New critical essays on Kurt Vonnegut* (pp. 27-45). New York: Palgrave.
- Thomas, P. L. (2010). *Challenging genres: Comic books and graphic novels*. Netherlands: Sense Publishers.
- Vonnegut, K. (1965). On science fiction. *The New York Times*. Retrieved from http://www.vonnegutweb.com/archives/arc_scifi.html0301502.html
- Vonnegut, K. (2005). *A man without a country*. New York, NY: Seven Stories Press.

P. L. THOMAS

1. A CASE FOR SF AND SPECULATIVE FICTION

An Introductory Consideration

Naming things is innately human, our apparently unique verbal nature, and central to academia and scholarship. In the 2011 film of the Marvel Comics superhero team, *X-Men: First Class*, Charles Xavier as a young man assembles a group of mutants, most of whom have lived in secret and unaware of other mutants. One scene shows those young mutants sharing their mutations, super powers, and then they do something interesting: they assume *new* names—Mystique, Banshee, Darwin, Angel, Havok. What is the purpose of the renaming? Is the name a badge of self-awareness, of a sort of *coming out* for these mutants who have been marginalized? Does a name liberate or restrict?

The Science Fiction Handbook, in fact, begins by confronting the tension surrounding the need to define, to name:

Most readers of SF spend little time or energy worrying about a definition of the genre or attempting to determine whether any given text is science fiction or not. They tend to know what sorts of stories and books they regard as science fiction and little trouble locating works in the category to read. Scholars and critics tend, however, to be more cautious (and finicky) about categorization, so that many studies of science fiction as a genre begin with lengthy meditations on the definition of science fiction, often in order to distinguish it from other forms of “speculative” fiction, such as fantasy and horror. (Booker & Thomas, 2009, p. 3)

I would add to readers and scholars/critics, writers themselves. Thus, we see Le Guin and Atwood wrestle with SF, fantasy, speculative fiction, and dystopian/utopian fiction as distinguishing labels:

To my mind, *The Handmaid's Tale*, *Oryx and Crake* and now *The Year of the Flood* all exemplify one of the things science fiction does, which is to extrapolate imaginatively from current trends and events to a near-future that's half prediction, half satire. But Margaret Atwood doesn't want any of her books to be called science fiction. In her recent, brilliant essay collection, *Moving Targets*, she says that everything that happens in her novels is possible and may even have already happened, so they can't be science fiction, which is “fiction in which things happen that are not possible today.” (Le Guin, 2009)

While Vonnegut (1965) both practiced and shunned the conventions of SF, Sterling (2011) grappled with both the evolution of genre and naming that evolution, “slipstream.”

Here in Chapter One, I want to examine the genre of SF as well as the many competing arguments about how to define and characterize the genre, including the various relating and distinguishable genres (notably speculative fiction and dystopian fiction), sub-genres, and multi-genres. But in this introductory consideration, I am proceeding with both the dangers and value inherent in naming things—as an act of classification that can render moribund something vibrant and as a celebration of what names any *thing* what it is. This grounding of the opening chapter and the chapters to follow attempts to honor the broad spectrum of reader, fan, student, teacher, academic, scholar, and artist—recognizing the perspectives of all without marginalizing the voice of any.

I take, then, a somewhat ambivalent stance about, for example, the powerful but esoteric view of SF argued by Suvin (1978):

SF is distinguished by the narrative dominance of a fictional novelty (novum, innovation) validated both by being continuous with a body of already existing cognitions and by being a “mental experiment” based on cognitive logic [emphasis in original]. This is not only nor even primarily a matter of scientific facts or hypotheses, and critics who protest against such narrow conceptions of SF as the Verne-to-Gernsback orthodoxy are quite right to do so. But such critics are not right when they throw out the baby with the bath by denying that what differentiates SF from the “supernatural” genres or fictional fantasy in the wider sense (including mythical tales, fairy tales, etc., as well as horror and/or heroic fantasy in the narrower sense) is the presence of scientific cognition as the sign or correlative of a method (way, approach, atmosphere, world-view, sensibility) identical to that of a modern philosophy of science.

My ambivalence lies in recognizing the weight and value in Suvin’s expertise and careful teasing out of what is and what is not SF, although my scholarly respect is deeply tempered by Booker and Thomas (2009) honoring the “know it when you read it” mentality of many readers and fans of SF who want to enjoy the works themselves and not be sidetracked by the rumblings around and about the classification of the works.

Next, I put the texts and reader upfront before offering a more scholarly and academic consideration that positions SF and speculative fiction within the teaching and learning dynamic. To start, then, I want to look briefly at Michael Crichton’s *The Andromeda Strain* as an exemplary text (both novel and film) for characterizing SF and complicating the act of naming.

THE ANDROMEDA STRAIN: KNOWING SF WHEN YOU SEE IT

Most people who have developed some serious or distinct interest in text (whether that be print, film, graphic, or otherwise) has had that fascination and fandom

spurred by a seminal work. And of course this event is more or less chance, as well as unique to each of us and universal in its happening. As I have noted in the Introduction, my SF fascination began with films that my mother enjoyed, specifically *The Day the Earth Stood Still* (1951)—she treasures the memorable “Klaatu barada nikto!”—and Vincent Price in *The Fly* (1958).

But my own self-awareness as a SF fan came in the form of *The Andromeda Strain* (1971) running on television. This film experience drove me to the novel, which was Michael Crichton’s first novel under his name and published in 1969. Crichton eventually moved to the center of the dinosaur and cloning elements of the SF world with the serialized *Jurassic Park*, but *The Andromeda Strain* offered readers a glimpse into the *other world* where some sort of alien life exists—although Crichton’s take isn’t the Blob or little green men (at least not “men”).

I want to consider what makes *The Andromeda Strain* SF, and I want to explore how other genre elements work in the novel (and film). I also pursue another multi-genre and multi-media question: What do *The Andromeda Strain*, Kurt Vonnegut’s *Cat’s Cradle* (1963) and *Galapagos* (1985), and Marvel Comics’ The Hulk and Iron Man have in common? And why does that matter to this discussion? First, let’s focus on *The Andromeda Strain*, the novel.

The initial aspect of the novel worth highlighting here is that its SF elements are reinforced by or parallel to the narrative being a thriller, one genre informing another. The central action of the novel involves the mysterious death of an entire town, Piedmont, Arizona, population 48 people, except for two survivors—the sickly, Peter Jackson, addicted to Sterno, and a crying infant. The science elements in the story are couched in mysteries involving the government and military carrying out clandestine operations, the mass deaths of the citizens of Piedmont, a police officer, and two men sent initially to investigate the event, the nature of the alien virus named The Andromeda Strain, and the precarious contingency plans surrounding the Wildfire facility and ground zero of the virus.

A reasonable argument can be made that the novel is a thriller with SF elements—just as much as classifying the work as SF with thriller elements. What, then, constitutes its SF grounding.

The novel begins with Lieutenant Roger Shawn, and as the story develops, the military becomes central to both the science and the mystery in the work. The connection between SF and the military is one powerful characteristic. *The Andromeda Strain* positions the military as willing to experiment with human life in order to secure an alien virus to use for biological warfare. Science in the hands of the military is also central to Vonnegut’s *Cat’s Cradle* (possibly a SF novel, but a complex mix of genres in itself, with its *ice-nine* sharing with the alien virus the possible ability to destroy the world) and the comic book superheroes The Hulk and Iron Man in the Marvel Universe.

Tensions exist in many SF works surrounding the potential of science, but many works of SF appear to suggest that less danger exists in science than in who pursues that science and why. The Hulk, for example, was created in 1962 (in the same decade as *Cat’s Cradle* and *The Andromeda Strain*) and like many SF works in the context of the threat of nuclear holocaust or disaster. The Hulk as a character

can be read as the personification of a modern Frankenstein's monster, but created by the human failure to seek science while ignoring ethical concerns. The Andromeda Strain virus is brought upon humans by the military in much the same way as The Hulk is spawned from a test explosion of a gamma bomb (much of the Marvel Universe grew from science experiments gone wrong, such as Spider-Man, unlike the alien Superman or the self-made hero, Batman from DC Comics).

Thus, one common element of SF may be expressed as an examination of the pursuit of science by highlighting the dangers inherent in *who* is governing that science and *why*. Embedded in this characteristic is also the tendency for SF to warn. It appears to be the place of SF works, novels or films or comic books, to draw readers and viewers to that other world that is close enough to the real world that the audience can see reality, not distorted, as it is in the work, but more clearly. The Hulk helps us see the monster in all of us just as *The Andromeda Stain* forces us to re-examine our faith in the military, the government, scientists, and even medical doctors.

The Andromeda Stain confronts, in fact, the "other world" quality raised by Atwood (2011). While Crichton's novel does examine alien life form, it doesn't transport the reader to an alien planet or onto a human vessel to explore life beyond Earth. In fact, *The Andromeda Stain* sits squarely in the now of its publishing, a slightly askew but significantly realistic 1960s United States. The novel itself is posed through the narration and even typeface as an official document (a technique also employed by Crichton in *Next*), framed masterfully in the Acknowledgements signed "M. C., Cambridge, Massachusetts, January 1969" (p. xv).

While Vonnegut's *Cat's Cradle* shifts readers to San Lorenzo and immerses them in an entirely new religion, Bokononism, and culture—to intensify the drama of the SF elements of the novel (*ice-nine*)—and the Hulk and Iron Man have otherworldliness highlighted by its graphic format as comic books, Crichton masks the other world with realism and accomplishes other worldliness with the Mojave Desert and the five-story underground facility used by Wildfire (the facility, in fact, has many characteristics parallel to spaceships). Wildfire serves as a quasi-inverted outer space, both possible as an act of human engineering and mythically a human-made and leveled hell.

The desert setting and underground, multi-layered facility both suggest hell, in fact—like the hellish nightmare experienced by Bruce Banner as the Hulk. The existential nature of SF is central to *The Andromeda Stain* as a commentary on hell-on-earth as a product of human choices and behaviors. The essential and pervasive affect of the novel is also fear, nested as it is within the very human science of the nuclear bomb. In the novel, a nuclear explosion is not at the core of creating the Hulk or Spider-Man, but the fail-safe device designed to stop the spread of infection brought upon humans by the military.

And the great irony of *The Andromeda Stain* is that the characters, almost too late, discover that the nuclear fail-safe would not cleanse the world of the virus, but provide it energy for massive reproduction. SF exposes, in Crichton, the folly of nuclear weapons regardless of the intent of the weapon.

The other world of *The Andromeda Strain* is both our contemporary world and the otherworldliness of a desert or a hellish subterranean fortress that serve to protect and possibly destroy humanity. This blending of realism, factual or near-factual speculation about science and the military, actual and imagined dangers, and intensified tension reflect the characteristics often found in SF, although not exclusive to SF. Examining *The Andromeda Strain* helps present a simultaneous clarification and muddling of just why we know SF when we see it. Crichton's novel raises questions of ethics (Is it ethical to kill people to save people? And is it in the purview of the government to make such decisions for people?), questions of the nature of life as well as alien life, questions of the role of nuclear power in human existence, and questions of the transparency and cloaked nature of government among a free people. But many genres can and do raise these questions as well.

Now, let me come back to a question I posed above: What do *The Andromeda Strain*, Kurt Vonnegut's *Cat's Cradle* (1963) and *Galapagos* (1985), and Marvel Comics' The Hulk and Iron Man have in common? And why does that matter to this discussion?

I noticed among these works, a mix of media—novels, film, comic books—with threads running through all of them that would reinforce the “we know it when we see it” characterization of SF—both as evidence that we can classify SF and evidence that it is a shifting set of criteria that we use even when we make such pronouncements. And, thus, let me pose our consideration of *The Andromeda Strain* within these other works and our discussion of SF as a few problems before moving on:

- Is the use of the military (in some form) a central thread running through SF? And if so, why does this genre blend science and the military so often?
- How powerful is the role of credible science against speculative science in the mainstream understanding of SF? Consider Atwood (2011) and Le Guin (2009) struggling with how to identify SF, speculative fiction, and fantasy.
- What are the ethical imperatives and dilemmas running through SF? Is SF uniquely concerned with ethical imperatives and dilemmas compared to other genres?
- How is science central to patterns of examining the nature of life on earth and the possibility of life beyond earth in SF?
- Is SF distinctly suitable as a genre to present the simultaneous tensions between the promise and threat of science for humanity? Is that tension between good and evil restricted to science, or is it also an allegory for the dual qualities of human nature, i.e. the Hulk?

One last consideration connected to *The Andromeda Strain* is worth a brief discussion; then I'll turn to a brief history of the genre and further discussions of just what constitutes SF as a genre among other genres and among a variety of media.

The Andromeda virus eventually mutates, adapts, posing a new danger for the main characters and all of humanity. Here is yet another central issue in SF—the use of science to self-reference. Science is both the motivation for SF and the

content of SF, in some way. Like the Hulk, the X-Men are a Marvel Comics exploration of mutation, but unlike the Hulk, the mutants of the X-Men appear to be both natural (not primarily created by some human mis-step or creation, like gamma rays or experiments gone wrong) and unnatural (in that these mutants don't belong among those who appear to be *normal*).

At the intersection of musing about mutation, a central element of evolution, *The Andromeda Strain* poses a discussion of the human mind that is eerily similar to the entire premise of Kurt Vonnegut's *Galapagos* (1985):

No one ever thought to consider whether the human brain, the most complex structure in the known universe, making fantastic demands on the human body in terms of nourishment and blood, was not analogous. Perhaps the human brain had become a kind of dinosaur for man and perhaps, in the end, would prove his downfall. (Crichton, 1969, p. 260)

And in *Galapagos*, Vonnegut speculates in the shadow of Charles Darwin, the personification of science, that the future of humanity involves the evolution of the brain to being smaller, not larger, for the exact reasons speculated upon in Crichton's *The Andromeda Strain*.

And with our too-big brains, we as humans are well suited to wrestle with abstractions such as naming SF, or not, as well as arguing that all this naming gets in the way of simply enjoying the genre that we know when we see it.

SF AMONG THE GENRES: A BRIEF HISTORY

This chapter, along with this section and the entire volume, is a situated work, a critical work. Necessarily, a brief and introductory history of SF and the many sub-genre, genre, and medium overlaps will be an extension of my own perspective as a reader/viewer, a scholar, and a teacher (the following chapters also occasionally integrate some versions of SF and related genre/medium histories as well). I am not suggesting my version is definitive, or even exemplary, but I am offering a critical entry into the broader concerns about genre, medium, text, and reading, and I am acknowledging here that this discussion is skewed to a Western perspective and an English-language bias.

When possible (in that my scholarly range is more narrow than the topic and field itself), I will acknowledge and consider the valuable contributions to SF beyond Western and English-language with the understanding throughout that no single work is enough on a field that remains vibrant and evolving. This, then, is *one critical* way into the SF discussion, and I hope it is a powerful invitation and a provocative consideration as reconsideration.

Here, I am discussing the history of Western culture, English language SF in order to lead to a tentative and incomplete consideration of exemplary works throughout the volume—again, potential touchstones for argument, more so than a claim that citing works (which is strongly influenced by other scholars attempting the same goal) endorses those works as *definitive*. The end of the chapter also includes an annotated bibliography of possible scholarly resources that examine the

SF genre and the many broad themes and concepts the genre returns to again and again. Now, what has come before to lead to what many now view as SF?

For the history of American literature, the works of Edgar Allan Poe and Nathaniel Hawthorne represent seminal moments for the evolution of a wide range of genres, a distinct set of media, and characteristic elements of craft that distinguish American literature from, most directly, British literature. SF has never been solely the domain of American literature or even English-language literature, but, for example, Hawthorne's "Rappaccini's Daughter" serves as a distinct opening example of the brief SF history below.

"Rappaccini's Daughter" is both an early model of essential aspects of SF—the dangers of science and experimentation, the blending of SF qualities with other genre elements (such as mystery, horror, fantasy)—and a work just as easily classified in some other genre than SF (which is likely how the work is traditionally viewed since Poe has been honored as a literary writer despite his genre roots and efforts to attain popular readerships). As well, Hawthorne is never confused for a SF writer, placing a consideration of "Rappaccini's Daughter" as SF within the context framed by Vonnegut and Atwood: Why and how are authors apt to work both within and against genre conventions such as SF, and why does this crossing into genre impact the literary credibility of writers?

Since Hawthorne and Poe worked at the inception of American literature, their self-consciousness was different than Vonnegut's or Atwood's—more a matter of the long and dark shadow of British literature than the literary bias inherent in genres. But the *situatedness* of, for example, Hawthorne's "Rappaccini's Daughter" both in that seminal American literature period and along the entire spectrum of history stretching to the present allows a consideration of the history of SF to raise essential questions and establish tentative essential characteristics to support a consideration of genre broadly and SF narrowly in a scholarly or classroom setting.

Now, I want to outline some of the key historical moments, including a range of media, that help create a framework for understanding the history of SF across those media and as that history interacts with and informs other genres. Many of the sources annotated at the end of this chapter (Booker & Thomas, 2009; Bould & Mieville, 2009; Gunn & Candelaria, 2005; Roberts, 2005) offer fuller discussions of the history of SF and the debates surrounding that history, but I will focus on Booker and Thomas and Roberts while augmenting their historical thread with my own experiences and fleshing out their primary focus on text-based media. If we begin here: "[S]cience fiction might be defined as fiction set in an imagined world that is different from our own in ways that are rationally explicable (often because of scientific advances) and that tend to produce cognitive estrangement in the reader" (Booker & Thomas, p. 4), then an outline of SF includes, but isn't restricted to, the following broad but key developments, essentially within identifiable centuries and decades.

Roberts (2005) argues that making historical claims are framed within both a time and genre distinction, the SF distinction being:

[A] delineation of the continuum by which SF can be meaningfully separated out as that form of the Fantastic that embodies a technical (materialist) “enframing,” as opposed to the religious (supernatural) approach we would today call “Fantasy.” (p. 21)

Form, specifically the novel, also contributes to Roberts’s perception of SF history since “the novel [was] ... the mode central to SF for much of its life as a genre” (p. 21).

Ancient Roots

The rise of SF shares the rise of the novel in many respects. The Greek novel (Roberts, 2005) and works such as Jonathan Swift’s *Gulliver’s Travels* (1726) are essential seeds of what comes to be viewed as SF (Booker & Thomas, 2009). Roberts recognizes the “trope of odyssey” (p. 22) as one ancient source of conventions central to SF, space travel for example. Lucian Samosata, Roberts notes, is often invoked as the first SF writer because of his work dealing with a moon voyage; however, earlier works offered similar characteristics.

SF has rich ancient roots, but Roberts (2005) notes that little occurred in its history from about AD 400 until the seventeenth century. This dark period included a shift to religious texts and the rise of poetry over prose.

SF in the 1600s

The rise of science cannot be separated from the rebirth of SF (as Svec and Winiski explore in Chapter Two). Roberts (2005) recognizes Copernicus and Bruno as foundational scientific thinkers upon which SF regained its footing. For example, scientist Johann Kepler (1571-1630), Roberts explains, produced science as well as a prose romance, or early SF. Seventeenth century SF also represents an enduring conflict in terms of classifying genres, presenting an early tension between SF and fantasy: “Stuart Clark has demonstrated at length that, instead of being opposed discourses, ‘magic’ and ‘science’ were viewed by most thinker sin the period as complementary and even aspects of the same truth” (Roberts, p. 45).

Broadly, Roberts (2005) identifies SF patterns in the 1600s that endure into the twenty-first century—space travel (see Cyrano de Bergerac), “other” worlds, utopias (as related to Sir Thomas Moore [1477-1535]), narratives set in the future, and stories of scientific development as well as speculation: “The more science itself became an empirical, experimental discourse, and therefore the less place speculative impulse had in the practice of science, the more important science fiction became” (p. 60).

SF in the 1700s

The Enlightenment also provided a fertile period for SF. Roberts (2005) identifies science and poetry: “The same SF dialectic between reason and magic filters

through into much of the Newtonian poetry of the time” (p. 67). Prose SF, notably the works of Jonathan Swift (*Gulliver’s Travels*) and Voltaire, from this era redefined “the rules of imaginative speculation” (Roberts, p. 68). Key conventions of SF are represented also in the eighteenth century—satire, utopias, aliens, fantastic voyages (notably flight), examining otherness, subterranean narratives, Moon exploration.

The development of SF included the influence of intersecting genres, as Roberts (2005) explains, “most historians of SF link the birth of the genre with Gothic writing. Brian Aldiss ... goes so far as to define SF as an offshoot of Gothic” (p. 82). SF as “future fictions” also flourished in the French Revolution era, fueling the challenging nature of SF into the next century.

SF in the 1800s

Referencing the work of Suvin, Roberts (2005) identifies the work of Mary Shelley and Edgar Allan Poe as key during the nineteenth century shifts in SF:

an increased interest in the mystical and theological component of interplanetary or interstellar Romances; reflections in imaginative literary form of nineteenth century advances in science, technology and industry; in some cases a direct mapping of Imperialist or political concerns into SF or utopian fantasy; and above all a much greater emphasis on the *future* as the area of science-fictional storytelling. (p. 88)

SF in the 1800s turned to the future, including considerations of the last human in existence. Washington Irving also introduced the green alien, but *Frankenstein: Or, the Modern Prometheus*, by Shelley (1818), is “often identified as the first genuine work of science fiction” because it combines a “[concern] with science overstepping its bounds” with “the various incarnations of the Faust story” (Booker & Thomas, p. 5). Here, SF’s roots are established: science and the threat of science, satire, and the quasi-mythological nature of the *new* mythologies embedded in SF characters and narratives.

Poe, Roberts (2005) adds, also “has his enthusiasts as the originator of” SF (p. 99). Roberts add that Poe’s focus on imagination as central to science stands as an important moment in SF’s history. By the later decades of the 1800s, SF assumed a dual or antithetical quality, between decay and evolution or utopia versus dystopia (Roberts). Other key topics and characteristics during this era include anti-gravity, mystical elements such as telepathy, futuristic war, robots, and the power of the human will (which Roberts links to the force in *Star Wars*, *The Matrix*, and Superman’s flying). A powerful if not crucial transition from Jules Verne to H.G. Wells bridges nineteenth century and twentieth-century SF.

SF in the Early- to Mid-1900s

SF parallels, then, the shifting evolution of the novel form by overlapping with other sub-genres, such as historical fiction. SF can often be described as having a

historical situatedness, whether in some reshaped past or imagined future: “Science fiction, in short, inherits the mantle once worn by the historical novel as the utopian literary genre par excellence and as the genre most capable of capturing the energies of the historical process” (Booker & Thomas, 2009, p. 6).

Thus, SF blooms out of the “‘scientific romances’ of H. G. Wells at the end of the nineteenth century” (Booker & Thomas, 2009, p. 6). Booker and Thomas note that the earliest SF is not entirely unique when compared to other forms by Edward Bellamy, William Morris, H. Rider Haggard, or Rudyard Kipling. “Verne’s fiction,” Roberts (2005) argues, “spools out and reels in the imaginative possibilities of radical change and radical departure” (p. 142). However, Roberts adds, “Wells did not invent science fiction; but he did revivify its core dialectic with promiscuous energy, and with lasting impact” (p. 154).

Like comics and graphic novels (Thomas, 2010), SF is linked strongly to the market: “Science fiction as a selfconscious publishing category is generally considered to have begun in 1926, when editor Hugo Gernsback published the first issue of *Amazing Stories*, the first magazine devoted exclusively to science fiction” (Booker & Thomas, 2009, p. 7). SF short stories are a key element in the development of the genre, as an important connection between genre and medium as well as a powerful element in the double-edged sword of popularity for the genre. By becoming popular, SF essentially created a wedge between the genre and the critics (again, something that is paralleled in the comic book industry). Booker and Thomas explain that *Amazing Stories* established a key arena for the next editor, John W. Campbell, and writers—Isaac Asimov, Lester Del Ray, Robert Heinlein, Theodore Sturgeon, A. E. Von Vogt.

Renamed *Astounding Science-Fiction* in 1938, the magazine reinforced through the work of Campbell what Booker and Thomas (2009) designate as the Golden Age of Science Fiction from the late 1930s through the late 1950s. This era included more magazines—*The Magazine of Fantasy and Science Fiction*, *Galaxy Science Fiction*—and “the short story continued to be a vital form for the exploration of new sf ideas” (Booker & Thomas, p. 7). Medium is central here as Asimov’s success as a SF short story writer translated in this period into novels as well. The pulps also introduced the visual connection between SF and its many media: “Almost as important as the stories was the visual look of the Pulp magazines” (Roberts, 2005, p. 184). SF silent films, serialized films, and the iconic Orson Welles’s *War of the Worlds* radio broadcast represent the genre/medium develops of SF also.

The significance of the visual also continued to develop throughout mid-twentieth century. Magazine and SF novel covers became distinctive and created popular SF artists. SF also fed and was itself reinforced by the growing comic book market, again making the graphic central to the impact of the SF genre and the various media. In comics, Roberts (2005) identifies the “human-to-superhuman transforming characters,” such as Sub-Mariner, Captain America, The Flash, and Green Lantern (p. 224).

SF distinguished itself as a genre and as a contrast to literary fiction throughout this Golden Age, notably by focusing on “social and political issues” instead of the

strong characterization emphasis in literary fiction (Booker & Thomas, 2009, p. 8). Booker and Thomas also identify the importance of SF building a “fan culture that has helped sf readers to establish communities of a kind unknown among devotees of ‘high’ literature, including an array of popular sf conventions¹ in which fans can meet each other as well as well-known authors” (Booker & Thomas, p. 8). Next, then, comes the rise of SF films in the 1950s—*The Day the Earth Stood Still* (1951) and *The Invasion of the Body Snatchers* (1956), the first of which is my mother’s favorite movie and the seed of my childhood fascination with SF and the second is crucial to understanding the allegorical power of SF as it paralleled literary works such as *The Crucible*, by Author Miller, which used the same metaphorical frame to address a social issue under the mask of genre (*Body Snatchers* using SF to mask Cold War fears and *The Crucible* using history to mask a confrontation of the McCarthy Era). Booker and Thomas highlight the power of SF to “avoid censorship”: Frederik Pohl, Ben Barzman, Pohl and C. M. Kornbluth (p. 8).

New Wave SF of the 1960s, 1970s

Booker and Thomas (2009) see the 1960s as a turn from Gold Age, “hard” SF to New Age, “soft” SF, “more character driven and more concerned with the social and political ramifications of technological developments than with the technologies themselves” (p. 9): typified in the pages of Michael Moorcock’s *New Worlds* magazine and Judith Merrill’s *England Swings* anthology. Roberts (2005) identifies the influence of the Soviet Union launching Spitsnik as well, spurring New Wave SF that “reacted against the conventions of traditional SF to produce avant-garde, radical or fractured science fiction” (pp. 230-231).

New Wave SF appeared determined to address also that the genre had been marginalized; regardless of SF’s critical status, however, this era includes foundational works across media and established some of the leading artists in the SF genre: Frank Herbert (*Dune*), Philip K. Dick, J.R.R. Tolkien (blurring the SF and fantasy fan-base), Stanley Kubrick’s *2001: A Space Odyssey*, Ursula Le Guin, Anthony Burgess (*A Clockwork Orange*), Joanna Russ, Marge Piercy, Alice Sheldon (James Tiptree Jr.).

The New Wave era should not be underestimated in its impact on the rise of SF in visual media, TV and film, as print-only SF often fed the now-classic TV series and films often most directly associated with SF—such as Dick’s *Do Androids Dream of Electric Sheep?* spurring Ridley Scott’s *Blade Runner* (1982) and a graphic novel series begun in 2009.

Late Twentieth Century SF Film and TV

While claims that “young people today” have abandoned reading print-texts for the immediate gratification of TV, film, and the Internet are disputed by evidence that traditional reading endures, pop cultures, especially in the U.S., has certainly been grounded in TV and film. SF has been instrumental in that phenomenon, and for

many people, the first associations they have with SF is a visual medium. To show how this looks historically, consider this list of TV and film works from the mid- to late-twentieth century: *Fahrenheit 451*, *2001: A Space Odyssey*, *Star Trek*, *Dr. Who*, *Star Trek: The Next Generation*, *Planet of the Apes* (and the sequels), *Star Wars*, *Batman* (TV series), *Alien* (and sequels), *Blade Runner*, *The Matrix* (trilogy), *E.T. the Extra-Terrestrial*, *Terminator* (and sequels), *Mad Max* (and sequels), *RoboCop*, *Jurassic Park* (and sequels).

Although still incomplete, that listing represents not just the impact of SF on late twentieth century pop culture, but also the enduring qualities associated with SF: androids, post-apocalyptic worlds, space and aliens, time travel, computers and technology. A credible argument can be made that SF during the late twentieth century, on the heels of New Wave SF, gained both the popular and critical respect it deserved. But another transition also came as a consequence

Recent SF and Beyond

Roberts (2005) recognizes that SF ascended to new heights during the decades of the 1960s-2000 with the huge success of SF TV and films, but “during this period the novel stopped being the prime mode of SF. As visual SF (particularly cinema and TV) increasingly came to dominate the mainstream, prose SF became increasingly sidelined” (p. 295). Roberts notes the shift did not mean a drop in quality of print SF or that the print fan base disappeared, but that SF as a popular and respected form appeared to move to visual media (Atwood’s *The Handmaid’s Tale*, for example, sparked both high praise and the debates about SF noted earlier).

A notable development in SF also included the rise of adaptation: SF superhero comics to films (*X-Men*, *Spider-Man*, *Batman*, *Superman*, *Watchmen*) as well as SF video games to film. But the adaptation trend also includes prose fiction to comics and graphic novels, and a seemingly endless overlap of comics/graphic novels, prose fiction, TV/cable series, video games, and films. SF continues in these adaptations to cross-pollinate with other genres and a wide array of media.

Critical Response and Scholarship of SF

A final consideration of the history of SF concerns the rise of critical response and scholarship. As SF became more mainstream, including its inclusion in the canon of K-12 and university classrooms, the critical and scholarly response also grew. Briefly here, that scholarship is noted to suggest that it helps clarify and capture the evolution of SF.

Most SF scholarship includes a retelling of its history, either in chapter or sections (Booker & Thomas, 2009; Bould et al., 2009) or entire volumes dedicated to that history (Roberts, 2005). Critical responses to SF also often address controversies and complications associated with teaching SF (Hellekson et al., 2010). As well, SF scholarship tends to highlight the key themes and topics that SF confronts as a genre—post-colonialism (Hoagland & Sarwal, 2010), women and

gender (Hellekson, et al., 2010; Reid, 2009), sexuality (Betz, 2011), race (Jackson & Moody-Freeman, 2011; Nama, 2008; Lavender, 2011), communism/Marxism (Bould & Mieville, 2009), and key authors/works (Booker & Thomas), for example. (See the selected annotated bibliography at the end of this chapter.)

* * *

My journey as a SF fan, teacher, and writer has evolved as SF has, a move toward my own changing view of what counts as SF as well as a scholarly and educational focus on exploring adaptation as a quest to understand, and not define, genre, medium, mode, and form. My problem with coming to know and admire the writing of Neil Gaiman has been replicated in a more recent fascination with Japanese writer Haruki Murakami, whose *IQ84* drew me to it in part because that novel was labeled, like *American Gods*, as SF.

Once again, I faced a conflict, echoed by Roberts (2005):

The gifted Japanese novelist Haruki Murakami (b. 1949) has written science fiction, but his SF novels owe more to the traditions of the ghost story and supernatural fable than to the particularly cultural dynamic that shaped the western genre [His novels] might similarly be described as “magical realism,” except that Murakami’s characters are too passive, in a sense too machinic, and his world too thoroughly immersed in the idiom of contemporary technology. (p. 323)

In short, Murakami’s work is both SF and not SF, although it often *feels* SF (maybe passing the *know it when I read it* test).

Yet, the exploration of SF as a problem remains with me the most enduring, just as we read SF as a confrontation of the world and all the unanswered and unanswerable questions that come with human existence. So this volume is both a consideration of SF as confrontation and our collective confrontation of the genre itself.

After the selected annotated bibliography below, Chapter Two turns to SF and speculative fiction novels as they helped professors Svec and Winiski confront science in a first year seminar.

SELECTED ANNOTATED RESOURCE LIST

Atwood, M. (2011). *In other worlds: SF and the human imagination*. New York: Nan A. Talese/ Doubleday.

Atwood dedicates her examination of SF to Ursula K. Le Guin, with whom Atwood had a public argument over the nature of SF—the apparent genesis of this volume. Atwood notes the book “is an exploration of my own lifelong relationship with a literary form, or forms, or subforms, both as reader and as writer” (p. 1). The book has four broad sections: “In Other Worlds: SF and the Human Imagination” (Atwood’s examination of SF as a fan, writer, and scholar), “Other Deliberations” (a collection of Atwood’s short pieces on SF), “Five Tributes” (five SF short forms by Atwood), and “Appendices” (an

P. L. THOMAS

open letter about the banning of *The Handmaid's Tale* and a brief essay about the connection between Atwood's *The Blind Assassin* and *Weird Tales*).

Betz, P. M. (2011). *The lesbian fantastic: A critical study of science fiction, fantasy, paranormal and gothic writing*. Jefferson, NC: McFarland and Company, Inc., Publishers.

In her preface to this volume exploring the “otherness” of being lesbian in the context of genre fiction, Betz explains:

The paradox of fantasy literature lies in its balance of attraction and revulsion, its creation of alternative worlds and realities based on the already experienced, its acceptance of difference while attempting to annihilate it. Within these contradictions lesbian authors and their readers have the ability to play out the meanings of Otherness and reconcile the fear that accompanies it. (p. 4)

Chapter Four focuses directly on lesbian science fiction, which she classifies as a subgenre of fantasy.

Booker, M. K., & Thomas, A. (2009). *The science fiction handbook*. Malden, MA: Wiley-Blackwell.

Booker and Thomas assemble an excellent introductory text about SF in western cultures. After a solid introduction, the volume includes a brief survey of SF subgenres (including time-travel narratives, dystopian and utopian SF, and other major types of SF), overviews of nineteen influential SF authors, and a concluding section on twenty major SF works. An outstanding work for scholars, teachers, and students.

Bould, M., Butler, A. M., Roberts, A., & Vint, S., eds. (2010). *The Routledge companion to science fiction*. New York: Routledge.

This edited volume collects a wide range of SF scholars presented in four parts—history, theory, issues and challenges, and subgenres. The individual essays cover all types of SF media and serve as excellent introductions to the complex genre in its many forms: “Sf has always been as much concerned with the past as with the future, and this volume stands at the moment in time, telling what has already passed in some of its richness, richness, detail, and diversity, and looking forward into possible futures,” notes the editors (p. xxi).

Bould, M., & Mierville, C., eds. (2009). *Red planets: Marxism and science fiction*. Middleton, CT: Wesleyan University Press.

This edited volume confronts the marginalizing characterizations of SF across media, notably the quality of many SF works and the impact of SF in pop culture. The collected essays address the many and varied aspects of most SF scholarship and weave through those examinations a focus on how

Marxism informs SF and SF informs Marxism: “However one responds to it, Suvin’s definition (and its elaboration) itself arrived like a novum, reordering SF theory and criticism around it, idiosyncratically and contingently wedding SF to Marxism” (p. 19). The works are organized in “Things to Come,” “When Worlds Collide,” and “Back to the Future.”

Clarke, A. M. (2010). *Ursula K. Le Guin’s journey to post-feminism*. Jefferson, NC: McFarland and Company, Inc., Publishers.

Le Guin is one of the major voices in SF, as well as a powerful advocate for the genre. Clarke’s examination of her work frames Le Guin with J.R.R. Tolkien and C.S. Lewis “for the quality and mythic status of her Earthsea series” (p. 1). This volume presents Le Guin’s SF and fantasy catalog in the context of her feminism: “I reinforce my position that Le Guin, now a post-feminist, follows the natural trajectory of the feminist evolution and so fully exemplifies the impact of feminism on the work of a significant writer,” and we may add on SF as well (p. 4).

Cornea, C. (2007). *Science fiction cinema: Between fantasy and reality*. New Brunswick, NJ: Rutgers University Press.

SF in pop culture may be defined more by film as by any other medium, even print-text. Cornea presents a chronological examination of SF films, but also highlights key and defining topics and elements of SF throughout that chronology. This format allows readers to grasp the evolution of SF as a genre as well as how SF film evolved within the broader classification. Each chapter also present key interviews for even greater insight in SF films, including writers, directors, actors, and one special effects technician.

Gunn, J., & Candelaria, M. (2005). *Speculations on speculation: Theories of science fiction*. Lanham, MD: The Scarecrow Press, Inc.

This often cited edited volume is divided into six sections—identification, location, derivations, excavation, infatuation, and anticipation—in order to present a complex effort to define SF. The essays reflect the attitude of the volume: “Uncertainty is a way of life” (p. xi)—especially in a scholarly work that speculates about the act of speculation (SF). James Gunn’s “Toward a Definition of Science Fiction” stands a key work in the field of SF scholarship.

Hellekson, K., Jacobsen, C. B., Sharp, P. B., & Yaszek, L., eds. (2010). *Practicing science fiction: Critical essays on writing, reading and teaching the genre*. Jefferson, NC: McFarland and Company, Inc., Publishers.

This edited volume is rich with diversity and approaches the exploring SF. The SF genre is examined here through the broad categories of teaching, reading and writing, media, and women. As Hellekson notes, the volume is unique in its “address[ing] the intersection among these three topic”—reading, writing, and teaching (p. 1).

Hoagland, E., & Sarwal, R., eds. (2010). *Science fiction, imperialism and the third world: Essays on postcolonial literature and film*. Jefferson, NC: McFarland and Company, Inc., Publishers.

This edited volume acknowledges the essential Western grounding of SF, but also notes the tension between defining SF against the genre both being and becoming: “This introduction,” Hoagland and Sarwal explain, “then, seeks to establish a middle ground through which to articulate some thoughts regarding the emerging genre of postcolonial science fiction, a hybrid genre that reflects intriguing affinities between two genres whose own parameters continue to vigorously contested” (p. 5). The essays are collected in four sections: re-inventing/alternate history, forms of protest, fresh representations, and Utopia/dystopia. Moving beyond the Western groundings of SF, the essays examine post-colonialism in and through SF.

Jackson, S., & Moody-Freeman, J. E., eds. (2011). *The black imagination: Science fiction, futurism and the speculative*. New York: Peter Lang.

The editors of this volume argue that SF connected with Black writers, directors, and characters “has begun to come into its own. It is no longer an anomaly” (p. 1). This edited volume also builds on the assertion that Black SF has older and deeper roots than many acknowledge. Eleven chapters explore the intersections of race with SF in a wide variety of forms as well as how Black SF addresses gender, sexuality, and power. This is an important volume both for its complication of defining and understanding SF and how the issues raised in SF reveal the essential critical nature of the genre.

Lavender, III, I. (2011). *Race in American science fiction*. Bloomington: Indiana University Press.

Lavendar includes quotes from Octavia E. Butler and Ralph Ellison to preface this volume—from *Invisible Man*: “Who knows but that, on the lower frequencies, I speak for you?” Ellison’s invisible narrator, it is worth noting, distinguishes himself from the popular SF novel; thus, this opening quote serves well to set the tone for Lavender’s work. In the introduction, Lavender recounts visiting Little Rock Central and confronting segregation in the U.S., concluding, “My surreal experience is the stuff of science fiction (sf). This rumination cause me to think ‘what if’...” (p. 2). This is an ambitious work, in which Lavender “attempt[s] to harness the signature language of modernity—science fiction—to explore and better understand the American heritage of race and racism related to black experiences with displacement, dispossession, and alienation filtered through more familiar racist structures such as slavery, Jim Crow, or offensive language” (p. 20).

Link, E. C. (2010). *Understanding Philip K. Dick*. Columbia, SC: The University of South Carolina Press.

The Understanding Contemporary American Literature series presents writer's works in accessible and thorough volumes, and this volume on Dick is no exception. Link identifies Dick as "a cultural phenomenon and one of the most celebrated writers of science fiction in the twentieth century" (p. xi). Link notes that this examination of Dick is a broad overview and introductory, focusing on themes and addressing the novice reader of Dick's works.

Nama, A. (2008). *Black space: Imagining race in science fiction film*. Austin, TX: University of Texas Press.

"[B]lackness and race are often present in SF films as narrative subtext or implicit allegorical subject," Nama explains in the Introduction to this volume on race in SF films (p. 2). Nama focuses on "black racial representation" in SF movies in order to examine broader issues of race in the U.S. (p. 6). This is an excellent work to focus on SF in the film medium.

Reid, R. A., ed. (2009). *Women in science fiction and fantasy*, vols. 1-2. Westport, CT: Greenwood Press.

"This project is the first general reference work focusing on women's contributions to science fiction and fantasy" across form and media, explains Reid (p. vii). Volume one includes 29 essays that span virtually every time frame, text form and media, and related topic imaginable bringing women/gender and SF/fantasy together. Volume two provides 230 encyclopedia-type entries and a wealth of scholarly references. This two-volume set is important as a look at women and SF, but also as a powerful reference for examining SF broadly.

Roberts, A. (2005). *The history of science fiction*. New York, NY: Palgrave Macmillan.

A SF novelist and scholar, Roberts presents a broad but thorough examination of the history of SF, starting with the problem of defining SF and working through the ancient roots of the genre and up to the still evolving twenty-first incarnations of SF. Roberts is knowledgeable and witty in his discussion, offering both neophytes and seasoned readers and scholars valuable insight into SF as well as the controversies surrounding the genre. While Roberts has clear and assertive stances on SF, this volume is effective at raising questions and problems that maintain a sense of SF history as a living, breathing thing.

Rossi, U. (2011). *The twisted worlds of Philip K. Dick: A reading of twenty ontologically uncertain novels*. Jefferson, NC: McFarland and Company, Inc., Publishers.

Rossi explains that "we have not come to terms with Dick yet," arguing that scholarship about Dick has "fallen short of the author" (p. 2). Examining twenty of Dick's novels, Rossi attempts to rectify some of the failures of

scholarship on the SF author by connection Dick's works with each other and with a wide variety of other texts and media. This volume, then, is valuable to anyone interested specifically in Dick, but also as a powerful examination of SF and the many problems with the genre.

Sullivan, III, C. W., ed. (1999). *Young adult science fiction*. Westport, CT: Greenwood Press.

Just as the *Twilight* series promoted a stream of young adult fiction featuring vampires, *The Hunger Games* trilogy revitalized the SF young adult fiction market. While this volume is becoming dated, the edited work's twelve chapters help establish the rich SF young adult fiction history, including SF young adult works internationally. As well, the volume helps examine both SF and young adult fiction as distinct and overlapping genres.

Suvin, D. (1979). *Metamorphoses of science fiction: On the poetics and history of a literary genre*. New Haven, CT: Yale University Press, 1979.

Suvin's now essential scholarship on SF was groundbreaking and confrontational when it was published. The tone and content explores the rich and strained history of SF and the scholarship about SF. As a review of the book notes, "It is almost, then, as if Suvin, instead of defining his genre, avoids defining it out of fear that the "subversive" form might turn out simply another handmaiden of bourgeois ideology" (Slusser, 1980. p. 75).

NOTES

- ⁱ See the 2011 film, *Paul*, which opens with and works against the convention element of SF as part of the film's larger satire and homage to SF fandom and films.

REFERENCES

- Atwood, M. (2011). *In other worlds: SF and the human imagination*. New York: Nan A. Talese/Doubleday.
- Betz, P. M. (2011). *The lesbian fantastic: A critical study of science fiction, fantasy, paranormal and gothic writing*. Jefferson, NC: McFarland and Company, Inc., Publishers.
- Booker, M. K., & Thomas, A. (2009). *The science fiction handbook*. Malden, MA: Wiley-Blackwell.
- Bould, M., & Mieville, C. (Eds.). (2009). *Red planets: Marxism and science fiction*. Middleton, CT: Wesleyan University Press.
- Bould, M., Butler, A. M., Roberts, A., & Vint, S. (Eds.). (2010). *The Routledge companion to science fiction*. New York: Routledge.
- Clarke, A. M. (2010). *Ursula K. Le Guin's journey to post-feminism*. Jefferson, NC: McFarland and Company, Inc., Publishers.
- Cornea, C. (2007). *Science fiction cinema: Between fantasy and reality*. New Brunswick, NJ: Rutgers University Press.
- Crichton, M. (1969). *The Andromeda strain*. New York: Harper.
- Gunn, J., & Candelaria, M. (2005). *Speculations on speculation: Theories of science fiction*. Lanham, MD: The Scarecrow Press, Inc.

- Hellekson, K., Jacobsen, C. B., Sharp, P. B., & Yaszek, L., eds. (2010). *Practicing science fiction: Critical essays on writing, reading and teaching the genre*. Jefferson, NC: McFarland and Company, Inc., Publishers.
- Hoagland, E., & Sarwal, R., eds. (2010). *Science fiction, imperialism and the third world: Essays on postcolonial literature and film*. Jefferson, NC: McFarland and Company, Inc., Publishers.
- Jackson, S., & Moody-Freeman, J. E., eds. (2011). *The black imagination: Science fiction, futurism and the speculative*. New York: Peter Lang.
- Johns, A. M. (2008). Genre awareness for the novice academic student: An ongoing quest. *Language Teaching*, 41(2), 237-252.
- Lavender, III, I. (2011). *Race in American science fiction*. Bloomington: Indiana University Press.
- Le Guin, U. K. (2009, August 28). *The year of the flood* by Margaret Atwood. *The Guardian*. Retrieved from <http://www.guardian.co.uk/books/2009/aug/29/margaret-atwood-year-of-flood>
- Link, E. C. (2010). *Understanding Philip K. Dick*. Columbia, SC: The University of South Carolina Press.
- Nama, A. (2008). *Black space: Imagining race in science fiction film*. Austin, TX: University of Texas Press.
- Reid, R. A. (Ed.). (2009). *Women in science fiction and fantasy*, vols. 1-2. Westport, CT: Greenwood Press.
- Roberts, A. (2005). *The history of science fiction*. New York, NY: Palgrave Macmillan.
- Rossi, U. (2011). *The twisted worlds of Philip K. Dick: A reading of twenty ontologically uncertain novels*. Jefferson, NC: McFarland and Company, Inc., Publishers.
- Sterling, B. (2011, March). Slipstream 2. *Science Fiction Studies* #113, 38(1). Retrieved from <http://www.depauw.edu/sfs/abstracts/a113.htm#sterling>
- Sullivan, III, C. W., ed. (1999). *Young adult science fiction*. Westport, CT: Greenwood Press.
- Suvin, D. (1978, March). On what is and is not an SF narration; with a list of 101 Victorian books that should be excluded from SF bibliographies. *Science Fiction Studies* #14, 5(1). Retrieved from <http://www.depauw.edu/sfs/backissues/14/suvin14art.htm>
- Thomas, P. L. (2010). *Challenging genres: Comic books and graphic novels*. Netherlands: Sense Publishers.
- Vonnegut, K. (1963). *Cat's cradle*. New York, NY: Delta.
- Vonnegut, K. (1965). On science fiction. *The New York Times*. Retrieved from http://www.vonnegutweb.com/archives/arc_scifi.html
- Vonnegut, K. (1985). *Galapagos*. New York, NY: Delta.

MICHAEL SVEC AND MIKE WINISKI

2. SF AND SPECULATIVE NOVELS

Confronting the Science and the Fiction

Today there is a nuclear-powered, laser-firing robot exploring Mars. This isn't fiction. Martian rocks are being zapped, not in defense of the planet Earth, but for the sake of knowledge. The rover is aptly named Curiosity, and she represents not only our advancing technical understanding but also our intense desire to explore, imagine, and create. Many scientists trace their inspiration to science fiction (SF), but as Carl Sagan (1996) notes, the relationship between science and SF is cyclical and mutually reinforcing.

Science and science fiction have done a kind of dance over the last century, particularly with respect to Mars. The scientists make a finding. It inspires science fiction writers to write about it, and a host of young people read the science fiction and are excited, and inspired to become scientists to find out more about Mars, which they do, which then feeds again into another generation of science fiction and science; and that sequence has played major role in our present ability to get to Mars.

In this chapter we describe how we leveraged this interplay between SF and science in a first year undergraduate seminar about Mars to create an environment in which students learned not only the facts about the red planet but also the habits of mind necessary to understand the scientific process and imagine its implications within the context of story.

Becoming and being a scientist or engineer no doubt requires deep content knowledge; however, a laser-like focus on “just the facts” comes with a cost. In the American Association for the Advancement of Science's seminal book *Science for all Americans* (1990) the authors describe the current science curriculum as “overstuffed and undernourished” (p. xvi) to the detriment of students' conceptual understanding and their ability to foresee and solve messy problems. According to the report, the development of values that undergird scientific habits of mind is of equal (if not greater) importance than content. Science-minded students are characterized by informed skepticism, curiosity, and openness to new ideas. Productive skeptics are more than just fact checkers, however. They understand where we've been and how we got where we are. This perspective reminds them not to hold too tightly to an idea and that the unraveling of a current theory may just be the next step towards a great discovery. When these values are cultivated, students begin to ask, “What if?,” and science and SF can offer productive environments in which to explore.

Taking informed skepticism to an extreme ruined SF for author Mike Winiski—for a while anyway. As a high school physics teacher, he used clips of Keanu Reeves and Sandra Bullock jumping fifty-foot gaps in the highway in a bus to teach projectile motion and illustrate the implausibility of such a venture. This practice extended to SF. In the movie *Mission to Mars* (2000), the dismemberment of a crewmember as he was pulled into a spinning vortex provided a wonderful opportunity to teach rotational physics. For a time, this instructor was the assassin of suspended disbelief, but the teaching moments were just too ripe for him to feel much regret.

Debunking bad science is important; the realistic portrayal and detail in contemporary movies may corrode the general public's understanding. A cartoon coyote violating the laws of gravity is easily recognized as implausible, but advanced special effects can trick moviegoers into thinking that flames in the vacuum of space are perfectly reasonable. With this in mind, The National Academies of Sciences has started a program, The Science & Entertainment Exchange (2013), which connects filmmakers with scientists to enhance the accuracy of the science portrayed on the big screen. Teachers use movies in classes to increase the students' scientific literacy and their ability to critique and analyze scientific images and arguments in film and television. Skepticism is a scientific value after all. While use of SF in the classroom has been found to help foster positive student attitudes (Freudenrich, 2000; Kilby-Goodwin, 2010; Firooznia, 2006; Barnett & Kafka, 2007), focusing solely on debunking can cause students to doubt even the solid science represented in the story (Czerneda, 2006) and certainly the extended possibilities. We are going to argue for another use, feeding the imagination and creative side of the future scientist.

For author Michael Svec, his love of astronomy was born one summer night at a Boy Scout camp during a star hike. It was the first time he had seen the moonless night sky away from city lights. No planetarium show had prepared him for what he saw that evening. When Svec returned to the yellow night sky of Chicago, it was Carl Sagan's *Cosmos* that fueled his new passion for astronomy. Sagan was a master at taking science, mixing in a human story, and asking speculative questions. Sagan's story telling was able to engage Svec such that he was angered by the burning of the Alexandria library, fascinated by the relationship of Johannes Kepler and Tycho Brahe, and intrigued by the possibility of large floating life forms in the atmospheres of Jupiter-like planets. Later as an undergraduate science major he had the opportunity to use the historic telescope at the university observatory and could not help but recall the episode "Blues for a Red Planet" as he drew his own pictures of Mars resembling those of Percival Lowell's (see Figure 1).

While not SF, Sagan's *Cosmos* engaged in speculation based on current science and provoked inspiration, curiosity, and imagination. SF likewise asks the "what if?" questions. The *Cosmos* episode of "Encyclopaedia Galactica" caught Svec's interest the most because of the concept of catalogues of hundreds of planets and civilizations. Sagan's foreshadowing of an encyclopedia of planets is current reality with well over 800 planets beyond our solar system known and more being

discovered. Good SF can possess many of the same characteristics of *Cosmos* and in that way feed the curious mind of the science-minded student and build on the central role of questioning in science.

As we move toward a pedagogical definition of SF, we are guided by the goals of providing students with the opportunity to develop both their sense of informed skepticism and wonder. Selecting SF only for its realistic portrayal limits the opportunity for students to explore the social, political, and ethical implications of the science that are so powerfully revealed through story. A focus on realism can also squelch the “what if?” questions which foster openness to new ideas and curiosity. On the other hand, stories that play too loose with the science diminish opportunities to teach its content and process. Our evolving scientific understanding over time complicates the mix. The plausible and the possible are a moving and interwoven target. But we can’t think of a better learning environment for students to experience the “rough and tumble enterprise” (Furman University, 2005, p. 9) of deep learning.

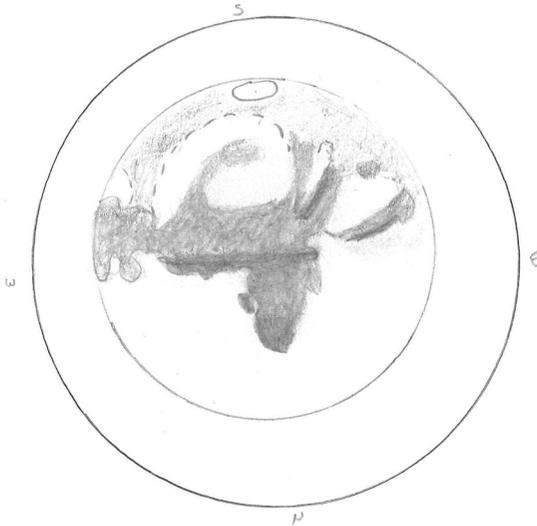


Figure 1. Mars on September 25, 1988 by Michael Svec at the University of Illinois Observatory.

DEFINING SCIENCE FICTION

What is SF? Classifying rocks and minerals or plants and animals is probably easier than classifying literature. Darko Suvin (1979) suggests that SF is a literary genre “whose necessary and sufficient conditions are the presence and interaction of estrangement and cognition, and whose main formal device is an imaginative

framework alternative to the author's empirical environment" (pp. 7-8). The empirical environment is literally the real world and the imaginative framework is the introduction of something new. The novum, the intrusion of something new into a world not unlike our own and validated by cognitive logic, is a defining characteristic of SF (Suvin, 1979, p. 63). The novum could be an alien, a discovery, or a new technology, but it must be possible, an extrapolation of our current understanding of science.

Margaret Atwood (2011) saw SF as descending from H.G. Well's *War of the Worlds* with speculative fiction tracing its origins to Jules Verne. Speculative fiction is about things, technologies that *could* happen but just haven't when the book was written, such as submarines and balloons. She did not see Martians arriving on Earth in metal cylinders, as portrayed in *War of the Worlds*, as possible. For Atwood, aliens are SF, not speculation. Atwood contrasted her meaning with Ursula Le Guin's belief that SF represented what could really happen. To Atwood's point, the idea of intelligent tentacle, blood-sucking Martians does seem more like fantasy based upon our current understanding of Mars, although Le Guin would counter that at the time *War of the Worlds* was written, it did represent commonly accepted thoughts about intelligent life on Mars and was thus speculative but grounded in the science of the time.

Paul Kincaid (2010) argued there is no such thing as a pure genre and "[e]verything is capable of being read in different ways. So the way we read a work, sometimes the way we *choose* to read a work, is crucial in determining how we identify it" (para. 35). Using Kincaid's logic, the authors are going to provide guidelines for selecting and reading SF and effectively integrating it into a course that also focuses on science content. From a pedagogical perspective we have assumed an understanding of speculative SF more consistent with Ursula Le Guin's broader conception of the genre (Atwood, 2011), which provides some leeway based on perspective. The inclusion of historical perspective (the scientific understanding of the time which formed the basis of the speculation) has immense pedagogical value because it illustrates the cycle of science feeding speculation and vice-versa, which Sagan so beautifully captures.

We have identified four overlapping and interwoven elements necessary for our pedagogical use of the speculative SF genre;

1. Deep description of the science content or technologies that were plausible or accurate to the time period.
2. The novum: A plausible innovation as a key element in the speculation.
3. Big Picture: Exploration of the impact on society and humanity.
4. Nature of Science: Science and technology as human endeavors

These elements guided our selection of SF for the course as well as the science content.

Plausible Science and Technologies

For use in our classes, the science needed to shape the story and play an integral role. The plausibility of the science being portrayed was important as it served as a

launching point for connecting to current science—a major portion of the course. For the students with a science background, inaccurate science within a novel can often become a distraction resulting in disconnect from the fictional story. In an interview, Sam, an Earth and Environmental science major, shared that realistic science pulled him into SF. He traced his SF roots to Jules Verne and found the author's inclusion of projectile motion calculations in *From the Earth to the Moon* made him more willing to engage with the story.

Some readers require less hard science to draw them in. John, a physics major we interviewed, did not draw a distinct line between SF and fantasy. He sought out both because he read to have his imagination engaged and stretched. He was willing to adapt his expectations accordingly; however, some readers find it difficult to be so fluid with their approach.

A famous cartoon by Sidney Harris (1977) illustrates our desire for a reasonable scientific explanation. The illustration shows two scientists standing in front of a chalkboard covered in complex formulas. One scientist says to the other, "I think you should be more explicit here in step two" while pointing to a spot on the board that reads, "Then a miracle occurs." Some moments in fiction play that way, like the scene in *A Princess of Mars* in which John Carter is magically transported to Mars from a cave on Earth. For some readers this *deus ex machina* (god from the machine) moment is too grand a leap and moves the story into the realm of the impossible or fantasy. But through story, SF can allow us to imagine in the fuzzy scientific space. While we may not be comfortable with a miracle, we may be willing to set aside the debunker in us and imagine "what if?" scenarios, as long as the story starts with the plausible and leads us to imagine the possible.

The Novum

Readers of any piece of fiction must find a touchstone, a place, person, or emotion, where they can connect and engage in the story. SF then introduces a *novum* as a means to create cognitive dissonance. In social psychology, cognitive dissonance is the discomfort people experience when there is a clash between their expectations and reality (Festinger, 1962). Within the context of the SF story, the *novum* becomes the mechanism to challenge our preconceived notions. It must be a scientifically or technologically plausible device such as a new technology, scarcity scenario, distant location, or future time that provides the catalyst sparking examination of our beliefs and expectations. The planet orbiting multiple suns in Asimov and Silverburg's *Nightfall* presents a society with many connections to our own familiar context, but when an unexpected eclipse reveals a night sky filled with stars, that society collapses into chaos. The reader may well have their beliefs in the stability of their society's foundational assumptions challenged. In our daily lives we try to reduce cognitive dissonance, sometimes by altering or modifying our beliefs or by ignoring the dissonance. Fiction becomes a safer place for exploration and helps us resolve dissonance.

The *novum*, within the context of our class, is the source of speculation, which connects to both curiosity and openness to new ideas. Scientists thrive on curiosity.

Science education should foster and then channel that curiosity into productive investigations. In addition, the scientific value of openness to new ideas can be demonstrated with the novum. The growth of scientific knowledge and technology comes from generating new ideas, and the novum can serve as the means to generate those innovations (Strauss, 2012). As *Science for all Americans* points out:

The purpose of science education is not exclusively to produce scientists, it should help all students understand the great importance of carefully considering ideas that at first may seem disquieting to them or at odds with what they generally believe. The competition among ideas is a major source of tensions within science, between science and society, and within society. (AAAS, 1990, p. 185)

Big Picture: Impact on Society and Humans

Important issues in our communities and society never involve questions of science and technology alone. Science is a human endeavor and part of a larger human ecosystem that includes other goals and institutions. SF can explore the impacts of science and technology at a variety of scales, from the individual to all of humanity.

The products of technology and discoveries of science impact society. Robots are frequently explored beginning with the robot rebellion in Karel Čapek's play *R.U.R. (Rosumovi Umělí Roboti)* to Marge Piercy's *Body of Glass*, a SF/cyber punk novel that examines gender roles, human identity, and artificial intelligence. Our student Sam enjoyed the way SF can play with the ethical dilemmas in ways that other societal institutions tend not to. For example, the life extending treatments in *Red Mars* are only made available to insiders, posing ethical and moral dilemmas that closely mirror current controversies related to access to health care based on income.

Science itself is a complex social activity with its own set of cultural values that can be examined in SF. Beyond the common mad scientists or independent gentlemen scientist hero stereotypes, there are examples that provide insight into the culture of scientists. Radio astronomer Ellie Arroway as the main protagonist in Carl Sagan's *Contact* (1985) provides one illustrative example. *Contact* also explores the influence of society on science. Society's concerns and needs often dictate research priorities through funding and public opinion, as Ellie learns as she struggles to secure financial backing for her research. Corporate funding and economic goals drove the cloning of dinosaurs in *Jurassic Park*, for example.

Nature of Science

Science is built on curiosity. *A framework for K-12 science education* (2012) includes as one of its guiding principles the importance of connecting science to student interests and experiences. Science education should both capture the

students' wonder and spark their desire to continue to learn about science. SF may well have a place among university science programs as a means to help sustain student interest as they progress through the science majors. For some science students, SF provides the larger picture and engages them in the speculative questions that might have served as their initial motivation for pursuing a science major. When Alex, a chemistry graduate, was asked if science majors should read SF, he responded: "Should pigs roll in the mud?"

SF can be read for enjoyment but also for the way in which it explores scientific concepts. As Czerneda (2006) noted:

Most science fiction authors ask, "What if?" and speculate about what could happen if a certain aspect of science or technology existed – or did not exist. By bringing science into the realm of individual lives as well as entire cultures, these stories are thought experiments about anything we can imagine, from global warming to evolution. (p. 39)

Good SF, from a pedagogical position, does not violate scientific principles but relies on them to spark the discussion of not only "what if?" but also "so what?" SF often engages in both science and technology.

Any education that focuses predominantly on the detailed products of scientific labor – the facts of science – without developing an understanding of how these facts were established or that ignores the many important applications of science in the world misrepresents science and marginalizes the importance of engineering. (NGSSF, p. 43)

Science for all Americans lists recommendations on what constitutes essential scientific literacy for all citizens including: science cannot provide complete answers to *all* questions, science is a blend of logic and imagination, science is a complex social activity, science is conducted based on generally accepted ethical principles, and scientists participate in public affairs as both specialists and citizens. SF can serve as a powerful means to explore these elements of science, for both majors and non-majors.

Being a science major often immerses students in a very narrow and deep exploration of one discipline. As science majors, the authors often felt that the larger issues were lost and the connection of the content to the larger world was difficult to see. Many science majors seek to find that relevance. SF is one means for science majors to explore the larger issues about the content's implication. Emma, one of our students now majoring in chemistry, reflected one year after the seminar: "[O]f course, it [SF] reminds you why you started to like science in the first place."

IN THE CLASSROOM

The first year seminar "Mars: On the Shoulders of Giants" was designed to be consistent with the university's curricular goal for the seminars: to ignite students' intellectual curiosity and to develop their ability to analyze and craft arguments.

Small class sizes of 15 encourage intellectual risk taking and foster community. The course was developed and taught by the two authors and David Moffett, the university's professor of astronomy. First offered in 2009, it has been taught four times with revisions along the way. This course focuses on how scientific knowledge is developed through the lens of our changing view of Mars throughout history. Analyses of current studies of Mars are juxtaposed against historical understanding and perceptions of the planet found in scientific and popular literature of the day, as well as the movies. Kim Stanley Robinson's *Red Mars* (1993) provides a unifying story throughout the course complemented by Fredrick Taylor's *The Scientific Exploration of Mars* (2010), Mary Roach's *Packing for Mars* (2010), and William Hartmann's *A Traveler's Guide to Mars* (2003).

A detailed analysis of the progression of our understanding of Mars throughout history was beyond the scope of the course. Instead, we focused on creating assignments that helped students develop habits of mind to better understand historical worldviews. Once students honed those habits, they could apply those experiences to the exploration of the interplay between historical mindset and speculative fiction. Deep dives trumped broad surveys, and we chose to focus on the following periods, which were oftentimes characterized by accelerated change and controversy:

- Tycho Brahe and Johannes Kepler and the role of Mars in shaping our understanding of a heliocentric solar system;
- The Canal Controversy— Percival Lowell, Alfred Russel Wallace, H.G. Wells, Edgar Rice Burroughs;
- The intervening period between Lowell and Mariner 4;
- The modern era and Kim Stanley Robinson's *Red Mars*.

Brahe and Kepler

During this period in history, Mars was just a reddish dot in the night sky; however, the red planet's path through the sky played a pivotal role in shaping our understanding of our place in the universe. Building on the work of his predecessors and analyzing copious observational data, Tycho Brahe nudged Earth's place in the universe slightly off center. His model still posited the earth at the center, and the sun still revolved around the earth. But Brahe claimed the planets revolved around the sun, rather than the earth. Jupiter and Saturn sent Kepler in a different direction. To Kepler, a diagram of the planets' conjunctions suggested divine order, and the astronomer devoted his efforts towards supporting his theory that nested platonic solids predicted planetary distances (Ferguson, 2002).

It's easy to dismiss these and other historical theories as quaint, anthropocentric, overly complicated, and obviously wrong. Brahe and Kepler's conclusions fly in the face of what we *now* know to be true; however, to summarily dismiss their tangents is shortsighted. We can learn a great deal about iterative nature of science and perspective by attempting to understand this moment in history more deeply. The tricky part is shedding our current understanding and putting ourselves in

Brahe's and Kepler's shoes. Envisioning the world through the fragmented and pre-telescope 16th century cannon is difficult. But even attempting to do so sheds light on Kepler's persistence and dedication to the *process* of science. His willingness to follow the data, coupled with the idiosyncratic nature of Mars' orbit (still a red dot at this point), more than just nudged our worldview. Kepler's *New Astronomy* knocked Earth squarely off its pedestal.

In addition to providing a compelling story that helped students develop habits of mind, which included understanding scientific exploration within historical context, Kepler also provided an example of the relation between science and speculation. While we decided to address more modern speculative fiction in lieu of tackling Kepler's *Somnium* in class, we used a description of his work (which provides a fascinating mix of science, personal experience, and fantasy) as a segue to 19th and 20th century works. Could a mind driven by curiosity and reason be predisposed to more creative speculation? Johannes Kepler seemed to be suggesting so.

The Canal Controversy

We summed up (admittedly too briefly) our progress in understanding Mars from the early 17th to the late 19th and early 20th century by showing sketches drawn by Christiaan Huygens, Giovanni Cassini, and others. We also acknowledged the buzz surrounding the possibility of extra-terrestrial life that coincided with publication of many of the Mars sketches (Fontenelle, 1686; Huygens, 1698). Students reviewed Schiaparelli's drawings, which included "canali" and descriptions of Earth analogs including named seas. In lieu of a detailed analysis of Schiaparelli's stance, the instructors summed up the astronomer's conclusions about the implications for intelligent life as non-committal. Flammarion's initial response to the implications of the canali sufficed to illustrate the tentative and cautious tone of many in the scientific community at the time: "... the Known is a tiny island in the midst of the ocean of the Unknown. Moreover, our senses are very limited; our power of perception is still lacking; our science remains, and will always remain, fatally incomplete" (Flammarion, 1981, p. 901; as cited in Markley, 2005, p. 59).

Percival Lowell was not so cautious. Based on meticulous observation, Lowell ignited controversy by suggesting that Mars, with its canals and oases, might harbor intelligent life. Once again, with the benefit of hindsight, it's tempting to dismiss Lowell as a hack, at least when it comes to interpreting observational data. But as with Brahe and Kepler, the reality is more nuanced and steeped in historical context. As instructors, we found ourselves navigating a tricky balance. How do we provide first year undergraduates with a sense of the broad strokes of the controversy, and hence the iterative nature of scientific understanding, and not overwhelm them with details? Rather than provide a comprehensive overview of the controversy, such as the excellent and detailed analysis provided by Markley (2005), we chose to focus on just a few aspects. Helping the students: 1) Understand what Mars actually looked like through an earth-based telescope in the early 20th century; 2) Elucidate the impact of Lowell's vision in the

mainstream; 3) Focus on the particulars of the response to Lowell's conclusions through the writings of Alfred Russell Wallace; 4) Articulate the perspective of individuals on both sides of the canal controversy (and those lost in the middle) through the lens of speculative fiction.

The preceding list suggests a linear progression; however, historical and speculative fiction readings and films were interspersed. Resources that predated the Mariner 4 flyby (and subsequent period of rapid change in our understanding of the red planet) were presented in roughly chronological order and included:

- *War of the Worlds*—H.G. Wells book (1898), recordings of Orson Welles radio broadcast (1938), and RadioLab's podcast (Abumrad & Krulwich, 2008) which chronicles the original and subsequent hoaxes.
- Excerpts from Edgar Rice Burroughs' *A Princess of Mars* (1917)
- The "Green Morning" from Ray Bradbury's *The Martian Chronicles* (1950)
- *Flight to Mars* film (1951)
- "Mars and Beyond" (1957), an episode from the *Disneyland* series
- *Robinson Crusoe on Mars* film (1964)

Telescopic observations of Mars or Jupiter (depending on what was visible during the particular semester) helped students begin to grasp the limits of Lowell's observations. Students read a modern day explanation for the canals (Hartmann, 2003) suggesting that wind streaks, coupled with atmospheric interference, could account for the appearance of Lowell's canals; however, one comment by an exasperated student illustrates just how hard it is to step into a historical perspective:

One thing I don't understand, is how he [Lowell] drew so much detail into the maps of Mars and how he saw all those lines. Because when I see the original sketches of Mars and what they were looking at, I don't see many of those lines, and I don't connect all the dots to form that map of Mars, with all the lines that he figured were canals and agriculture.

While this statement could be interpreted as proof of the elusive nature of historical perspective, we found it exciting that the student seems to be in the same liminal space as the early observer.

The tendency of the media to give Lowell the lion's share of the spotlight in the controversy and the impact of his speculation on the collective imagination is well-chronicled (Markley, 2005); however personal stories provided an even richer window into Lowell's influence and helped students (and the instructors) form a deeper understanding of historical perspective and Mars' impact on the speculative psyche. Facsimiles of several letters from Alexander Graham Bell to his wife, Mabel, proved to be a goldmine. Bell's admiration for Lowell in the uneven, typewritten letters is unmistakable. In 1901 he tells Mabel, "I wish I had your opportunity of crossing the Atlantic with Percival Lowell. I wonder whether you talked with him about Mars" (Bell, 1901, p. 2).

In a letter written from his houseboat (Bell, 1909), he reflects on man's insignificant size in relation to the planet. He clearly respects and agrees with Lowell's scientific conclusions. For Bell, Lowell's induction that Venus' rotation

rate makes the planet inhospitable to life is both convincing and disappointing. “No signs of life, however, have so far been observed; and now Professor Lowell comes forward with a statement concerning rotation that almost deprives us of hope” (p. 2). Bolstered by a 3-page recap of Lowell’s observations and inferences regarding Mars, Bell returns his gaze to Venus, unwilling to write off the possibility of life there:

Surely there must be a narrow belt around the planet, between the frozen and heated sides constituting a temperate zone where life may possibly exist: A region where . . . , without either setting to freeze, or rising to roast, the living things that might take refuge there. (p. 8)

While discussing these letters in class, one student commented, “It sounds like Bell is working up a science fiction story here.” Clearly, hope, science, and speculation could collide to inspire great stories, especially in a time of rapidly changing understanding of the red planet.

A seemingly odd end to Bell’s 1901 letter helped us better understand how our present day understanding can obscure historical perspective. After a brief reflection comparing correspondence via telegraph and letter (speed vs. depth) and questions about Queen Victoria’s funeral, Bell’s letter to Mabel ends abruptly:

INTERRUPTED. Dear Mrs. Bell:—Mr. Bell was called down the Census Office, and so I will have to send of this fragment of a letter. He was just getting down to write you a nice long letter, it is a shame. (p. 3)

The class was perplexed. Why couldn’t Bell just finish the letter the next day? Why send out the fragment? Why was his secretary taking over his letter? It was difficult for us to even articulate why the abrupt finish seemed so strange, until students began describing the assumptions they brought to the reading. We realized that every single one of us (instructor included) pictured Bell hammering away at the typewriter himself, when it’s much more likely that he was dictating the letter which was to be typed later. In the age of the keyboard, we had to take a minute and unlearn our ingrained habits of mind surrounding correspondence. Many assumed daily postal pick up and delivery and that waiting a day would not significantly impact delivery. Understanding that we couldn’t *fully* inhabit an early 20th perspective paved the way to a more thoughtful approach to speculative fiction of the time and freed us up to imagine alongside our early 20th century friends. From years of teaching science, the instructors knew that scientific misconceptions could be tenacious; we could now add inhabiting historical perspective to the list of challenging concepts. Forgetting what we know doesn’t come easily, but we were making strides.

Lowell’s 1895 *Atlantic Monthly* article “Mars III: Canals” and Alfred Russel Wallace’s critical response in *Is Mars Habitable?* provided the students with the opportunity to wrestle with some of the details of the controversy firsthand. While the readings are dense and difficult, we worked with the students to distill and summarize the arguments from both sides. Students were guided to approach the readings with an eye towards high-level arguments, rather than getting bogged

down in the details. Lowell argues that the patterns of canals, visible from Earth only due to the surrounding vegetation, are simply too regular and seasonal to be of similar origin as cracks radiating from craters on the moon (Lowell, 1906). Wallace counters that Mars is too cold and the atmosphere too thin to support liquid water (Wallace, 1907). The arguments are obviously more complex, but having students experience the tenor of the debate and Lowell's leaps from observation to inference were as important as how the authors used conflicting observations to support their claims.

Lowell's focus in future writings on the dying nature of the planet and implications for our own future set the stage for the speculative and environmental focus of *Red Mars* used later in the course. Markley (2005) beautifully summarizes the impact of Lowell's writing on our earthly perspective:

The analogy between Earth and Mars has been subtly inverted; rather than imposing terrestrial conditions onto the red planet, Lowell reimagines humankind's present and future in terms of a dying world on which "we are able to glimpse, in some sort, our future." (Lowell, 1906, p. 384; as cited in Markley, p. 94)

In a culminating assignment to articulate historical perspective, students were asked to craft a film or book review of their choice from the aforementioned list from both Lowell's and Wallace's perspective. By giving the option to review pieces from Lowell and Wallace's future, we violated our plausibility assumption, exploring together the blurry line between plausibility and possibility.

Our *War of the Worlds* (WoW) discussion was deep and centered around the live RadioLab broadcast (Abumrad & Krulwich, 2008) that posed the question, "Could It Happen Again? (And Again?)." By this time, the students had listened to recordings of Mercury Theatre's 1938 broadcast and read Chapter One ("The Eve of War") of H. G. Wells' novel. Reviewing the broadcast from the perspective of Lowell and Wallace, most students felt the former would find the speculation credible while the latter would roll his eyes at the flimsy science on which the broadcast was based.

The podcast provided additional historical context and explored our penchant for being pulled into a good story. The hosts described Mercury Theater's meticulous attention to the broadcast realities of the day to heighten plausibility. The "we interrupt this broadcast" style of the production was patterned after Edward R. Murrow's reports from war-torn Europe, and one radio actor went so far as to mimic Herb Morrison's (1937) coverage of the Hindenburg disaster to heighten the realistic feel of the broadcast. Plausibility was entrenched in the reality of the day, with Percival Lowell helping to set the stage. Subsequent interviews with radio listeners revealed that many interpreted reports of war machines and poisonous gas as a German invasion. According to interviewees, reports of Martians were just indicative of reporters getting the details wrong, but the perceived threat was just as scary. Other listeners described initial skepticism being allayed by the inclusion of "expert scientific testimony" during the broadcast. The power of suggestion was so trenchant, that many even reported

seeing smoke and Martian war machines on the horizon (Abumrad & Krulwich, 2008).

If the modern day observer is tempted to ascribe ignorance of the day to the 1938 panic, the podcast's description of the 1949 Quito incident is enough to provide serious pause. Radio Quito's re-enactment of the WoW production, replacing original locations with local places, wreaked havoc. Reports of strange objects in the sky and radio interference in the days leading up to the main broadcast set the hook. The reaction to the broadcast was so visceral that interviewed residents reported scenes of individuals confessing their sins on the spot and mobilized military heading out to fight the invasion. Once the hoax was revealed, angry citizens stormed the radio station, pelting it with rocks and eventually burning the building to the ground. Six people were killed in the ensuing riot. The perpetrator of the hoax fled to Venezuela, never to return (Abumrad & Krulwich, 2008).

The description of the reaction to a 1968 Halloween adaption of WoW by WKBW radio in Buffalo, NY confirms our predisposition for speculation. Over 4,000 listeners called the radio station to get more details and devise evacuation plans (Abumrad & Krulwich, 2008). We can get fooled again. Perhaps the fact that we are built for story, coupled with our poor understanding of science and anxieties of the day, could suck us in. Plausibility is a nuanced beast, and our relationship with story complicates the picture.

The intervening period between Lowell and Mariner 4

Disney, a master storyteller, sucked us in deeper. The students and instructors were enthralled with "Mars and Beyond," an episode from the *Disneyland* series (Kimbell, 1957). The beautiful images creatively illustrating the impact of Mars on our imagination, including animations inspired by Edgar Rice Burroughs, seemed to break through the stranglehold that science had imposed on our creativity and our willingness to imagine. Speculation about the nature of life on Mars runs wild in the episode, but we set aside our disbelief and current understanding to simply enjoy the art and story. At that moment, speculative fiction wasn't just a place for us to imagine current science extended (or witness historical understanding in snapshot), but it was fodder for wilder, unrestrained speculation.

The second half of the production brought us somewhat back to reality, as Dr. E. C. Slipher described our 1957 understanding of Mars. Blurry traces of Martian canals still cover the Martian globe Slipher uses for his scientific discussion of Martian seasons, tilt, atmosphere, and temperature and the potential the planet holds for life. Based on spectrographic data, Slipher incorrectly concludes that Mars' atmosphere "probably consists mostly of nitrogen and a small amount of carbon dioxide" (Kimbell, 1957), illustrating that our knowledge of Mars in the pre-Mariner days was still quite sketchy. The Sliiphers tie to the Lowell observatory also provided an appropriate historical link to our earlier studies of Lowell. But more than provide another historical lens, Disney, like it so often does, reinvigorated our relationship with story.

The students' analysis of *A Princess of Mars* (1917) at first seemed fairly straightforward. Taken to the extreme, Lowell's interpretation of the surface of Mars could serve as a foundation for a rollicking, over-the-top story, given that the reader was willing to play along (and thanks in part to Disney, we were). Students thought Wallace would have hated the premise on which the story was built—bad science, extrapolating too much from naturally formed cracks and more fantasy than speculation. Unable to shed our modern-day experience, we were more apt to agree and classify the tale as fantasy, suggesting that genre may be time-bound.

Despite classification challenges, the students felt that a story of conflict over limited resources on a dying planet could inform our own present and future predicament on planet Earth. At this point, the question of how humans might deal with scarcity (a novum) and its implications was ill-formed but began to persist a bit like Neo's notion of the Matrix. Morpheus tells Neo, "You've felt it your entire life, that there's something wrong with the world. You don't know what it is, but it's there, like a splinter in your mind, driving you mad" (Silver, 1999.) Implanted through the notion of scarcity, the splinter in this case came in the form of loosely articulated questions that we would revisit and shape throughout the latter half of the course:

- What will Earth be like when resources become even more scarce?
- What if another planet could serve as our lifeboat? Do we have a right to stake a claim to that lifeboat and its potential inhabitants?
- Do we have moral obligations to preserve our own or even another planet?
- Do our needs trump natural order or sacredness of place?
- Just because we can, should we?

This discussion marked a subtle shift from analyzing speculative fiction from the perspective of history to asking what the genre could tell us about our potential future and the role science could play—and the sticky questions on the horizon. *Princess of Mars* served as an unintended inflection point.

Ray Bradbury's *The Martian Chronicles* (1950) pushed these blurry questions forward. This compilation of loosely knit short stories launches from a future Earth in peril. In the story "The Green Morning," Benjamin Driscoll speculates and struggles with scarcity—the dearth of breathable air. He looks beyond current mining exploits and envisions a more earth-like Mars, covered in trees that provide oxygen for the new explorers. He plants vigorously to push his vision towards reality. Driscoll awakens to find thousands of trees have grown overnight, transforming Mars into a more habitable home. Unlike his *Red Mars* counterparts, who we visit later in the course, he doesn't hesitate a second to ponder, "Should I?" At this point in the course, the story felt more like a strange aside, but the notion of terraforming had been planted (pardon the pun), and the awareness of our desire for a home that resembled our own had been heightened, albeit in a weirdly wonderful way.

Scarcity is a continued theme in the movie *Flight to Mars* (1951), as the inhabitants of the red planet struggle with the depletion of their primary energy source, Corium. The class viewing resembled an episode of *Mystery Science Theater*, as students had fun pointing out the low production quality, the fact that

the inhabitants (rather than the visitors) wore space suits, the sexist portrayal of the female scientist's excitement over the accouterments of the Martian kitchen, and the Star Trek-like thrashing of the crew as the spaceship hit turbulence. The film seemed more a cheesy diversion than representative of historical plausibility, but the fact that scarcity drove some of the Martian inhabitants to deceit and visions of Earth conquest was now clearly a common organizing story principle.

Robinson Crusoe on Mars portrays a warmer and wetter planet, although the thin atmosphere requires the administration of "air pills" for the earth visitor, Kit Draper. The liner notes to the DVD contain current (circa 1960) facts about Mars and suggest there may be sufficient oxygen closer to the planet's surface. A quote from Dr. Wernher von Braun is included stating that, "A man can stay alive longer on Mars than a native of the tropics could exist in the Arctic." These "Mars facts" highlight our evolving understanding of the planet. In addition to providing a somewhat historical snapshot (or at least a snapshot of historical Hollywood plausibility), the movie hints at the issue of scarcity. Friday, Draper's companion and friend for the remainder of the film, is a Martian native and escaped slave from the Martian mines. In this scenario, scarcity had driven a fictional civilization to subjugate others in the name of survival, subtly posing the question, "What would you do?"

This period of the course, like our understanding of Mars at the time, was one of transition. Our focus shifted from seeing speculative fiction only as a window into scientific understanding, and hence plausibility, to larger themes and ethical questions. At this point, we started looking forward more than back.

The Modern Era and Kim Stanley Robinson's Red Mars

A wide variety of resources guided us into the modern era, during which our understanding of the planet's surface changed drastically. Non-fiction such as *A Traveler's Guide to Mars* (Hartmann, 2003) and *The Scientific Exploration of Mars* (Taylor, 2010) provided much of the foundation to support our goal. We wanted students to get a sense of the gestalt of Mars as we now know it—the relatively young and flat northern plains, the heavily cratered southern highlands, and the canyons and volcanoes of the Tharsis region. Specifics were subservient to process, however, as we asked students to focus on theories of formation and evidence to support those theories.

To foster a process-oriented approach, we asked each student to become an expert on a specific chapter in *Traveler's Guide* which either focused on a particular region (Marte Valles, Olympus Mons, Aram Chaos) or phenomenon (dust devils, dunes, and crater types). While the chapters were well organized, we worried that the sheer density of information could steer students towards presentations that were more information-dump than coherent story. Enter PechaKucha (Japanese for chit-chat), a presentation format devised by architects in Tokyo to slay droning and over-bulleted PowerPoint presentations. In this model, the presenters are constrained to 20 (generally image-based) slides to tell their story, and the slides advance automatically every 20 seconds (Klein Dytham

Architecture, n.d.). With under 7 minutes to tell a story, we hoped that students would be more likely to spend their time selecting and evaluating the importance of a particular concept within the big picture, rather than bombarding the audience with disconnected details. Students also accessed the most recent images from the current spacecraft exploring Mars.

To emphasize patterns of recent discovery, every third student PechaKucha presentation was followed by a comparison discussion, during which the students worked to identify connections. After an especially compelling presentation describing how ice depth can be inferred from crater patterns, we asked the student where she found the crescent-shaped image that succinctly showed the general trend of shallower ice as one progressed from the equator to the Martian poles. She replied, “I made it. I couldn’t find an image that summed up the general trend.” Score a victory for analysis and synthesis. While far from a panacea, the presentation constraints seemed to help shift the student focus towards process and patterns.

We didn’t expect all the details or even general trends to stick, but perhaps revisiting the Martian landscapes in the context of story could help students further develop their geological understanding. In *Red Mars*, which is set in the future (2026), Robinson situates the story within beautiful and accurate descriptions of the Martian surface, at least based on our understanding at the time (1993). The link between story and landscape seemed strong, perhaps because familiarity with Martian geology helped students be more attuned to the setting. During class discussions, several students wondered if Robinson chose different locations on Mars with the intent of aligning landscape with the tone of events that were described in the novel. For example, Olympus Mons (a high spot on Mars) is the scene of a hopeful reunion of characters, while a murder attempt takes place at Senzeni Na, a fictional location in the Thaumasia region of Mars. Thaumasia appears to have been volcanically active and is characterized by faults which spread across the landscape. Was this fracturing symbolic of the political and environmental factions potentially behind the murder attempt or just background for the action?

Place certainly mattered at the planetary scale, but we decided to dig deeper into the relationship between the geologic vibe of specific locations on Mars and events portrayed in the story. Each student chose several passages from the novel that they found revealing, pivotal, or complex, then authored reflections about these different events. The reflections were anchored to the location where the events occurred in Google Mars™. Conveniently, Google Mars provides a layer that corresponds to selected excerpts from *Traveler’s Guide*, so that after compiling the student text, we were presented with a virtual planet that was a mix of story, analysis, satellite maps, and technical descriptions of the landscape. Fictional locations like Underhill, Burroughs, Senzeni Na, and Bradbury point were interspersed amongst real Martian features such as Vastitas Borealis, Lunae Planum, and Valles Marineris, blending the known and speculative.

Beyond landscape, we wanted to move further down the speculative scale and explore plausible future scenarios, challenges, and implications. Interweaving

fiction and non-fiction helped to push this goal forward. While technically classified as non-fiction, *A Case for Mars* (Zubrin, 1996), hinges on speculation, based on current science. In the first chapter, Zubrin describes a scene from the future:

At the end of a year and a half on the Martian surface, the astronauts clamber aboard the ERV [Earth Return Vehicle] and blast off to receive a heroes' welcome on Earth some six months later. They leave behind Mars Base 1, with the *Beagle* hab, a rover, a greenhouse, power, and chemical plants, a stockpile of methane/oxygen fuel, and nearly all of their scientific instruments. (p. 12)

More details follow. In fact, only a few aspects seem to distinguish Zubrin's speculation from Robinson's account in *Red Mars*:

- Robinson's speculation is wrapped in story. Add murder, a red-bearded anarchist, high explosives, and a beautiful Russian cosmonaut to Zubrin's vision, and the two accounts begin to converge. But *Red Mars* provides a narrative in which students have more freedom to explore the *implications* of scientific progress than within Zubrin's fairly technical account.
- As our student intimated, the reader brings a different set of expectations to each account. We expect the non-fiction version to include ample backing to support the author's vision, and Zubrin complies. Because Robinson crafts his vision within a story, we seem willing to cut him some scientific slack. It's up to the reader to decide if space elevators, nuclear power, terraforming, and bases on Phobos are plausible, or at least within the realm of possibilities. The onus is on the reader.

While Zubrin touches on the human element, Mary Roach (2010) dives headlong into all the messy and smelly details of space travel in *Packing for Mars*. According to Roach,

To the rocket scientist, you are a problem. You are the most irritating piece of machinery he or she will ever have to deal with. You and your fluctuating metabolism, your puny memory, your frame that comes in a million different configurations. You are unpredictable. You're inconstant. You take weeks to fix. (p. 15)

Through her humorous and graphic account of experiments in weightless sex, turds floating through space capsules, and the psychological impact of sharing small spaces with other humans, we get it—clearly. But experiencing these issues through the characters in *Red Mars* allowed the students and instructors to go deeper. John, one of the students in the class, pointed out that while the science in the story was compelling, the depiction of the fictional crew in *Red Mars* solidified the political and social implications of the science. As a student in one of the classes noted, “Red Mars helped me realize that humans in space are still humans.” In this case fiction and non-fiction paired beautifully.

To explore the broader issues raised through the story, clicker statements such as those below, with the only option to anonymously agree or disagree, were

presented to the class to frame and complicate the discussion. Interestingly, students proposed slight modifications to several statements, and re-voting revealed nuance and additional discussion points. Example statements included:

- The first person to land on Mars should own it (Pisaturo, 2002).
- “In other words, it is the explorer, not the homesteader, who may be the creator of the initial value of the body of land. And the creator of the initial value is the rightful owner” (Pisaturo, 2002, p. 214).
- “If no private organization wants to explore Mars in the absence of government financing, then - unless there is a valid military need - Mars should not be explored” (Pisaturo, 2002, p. 215).
- We have far too many problems on this planet to consider exploration of another.
- Humans will land on Mars in my lifetime.
- Despite the risk and length of the trip, if I were selected to be an astronaut on a Mars mission, I’d do it.

The last statement above was posited to one particular class at the beginning and end of the semester. Interestingly, while the majority of the students at the beginning of the term said they would embark on the trip, only one agreed by the last day.

Additional statements regarding terraforming, another novum, were also provided:

- I think the idea of terraforming Mars is heretical - tantamount to humans playing God (adapted from Zubrin, 1996, p. 266).
- “I would say that failure to terraform Mars constitutes a failure to live up to our human nature and a betrayal of our responsibility as members of the community of life itself” (Zubrin, 1996, p. 267).

Like Driscoll in the *Martian Chronicles*, characters in *Red Mars* link the alien landscape to home. Arkady Bogdanov, a Russian with a penchant for anarchy and desire to see the red planet serve as a chance for a more equitable society, names the nuclear plant on the surface “Chernobyl.” The first habitats are referred to collectively as “the trailer park,” rather than providing them with a more original Martian moniker. Russian engineer, Nadia Chernyshevski, breaks through this earth-bound perspective when she makes an extended journey to the northern plains of Mars. Inspired by the expansive views, Nadia’s perspective shifts:

Beauty could make you shiver! It was a shock to feel such a physical response to beauty, a thrill like some kind of sex. And this beauty was so strange, so *alien*. Nadia had never seen it properly before, or never really felt it, she realized that now; she had been enjoying her life as if it were a Siberia made right, so that really she had been living in a huge analogy, understanding everything in terms of her past. (Robinson, 1993, pp. 141-142)

The settlers’ view of the Martian landscape and their place within it doesn’t simply influence naming conventions and inspire appreciation. This worldview drives many to call for action. Almost immediately, stifled by their inability to spend significant amounts of time on the surface due to radiation concerns, some of the

Martian colonists advocate for immediate terraforming efforts—despite the fact that it’s not their call. Decisions about terraforming ultimately fall to the corruptible United Nations Organization Mars Authority (UNOMA). Two factions quickly form on the red planet and on Earth. The Greens, typified by physicist Sax Russell, want to begin the long process of creating and releasing greenhouses to make Mars more earth-like. Unlike Bradbury’s Driscoll, many Greens do ask the question, “Should we?” They conclude, however, that the ends (sustaining the human race in an environment of limited resources, or in Arkady’s case, the opportunity for independence), justifies the means (irreversible terraformation).

The Reds, whose position in extreme is represented by geologist Ann Clayborne, want to see Mars left in as much of a pristine state as possible. Ann even regrets the tire tracks they leave as the team explores the northern regions with Nadia. She laments,

We’ll all go on and make the place safe. Roads, cities. New sky, new soil. Until it’s all some kind of Siberia or Northwest Territories, and Mars will be gone and we’ll be here, and we’ll wonder why we feel so empty. Why when we look at the land we can never see anything but our own faces. (Robinson, 1993, p. 158)

Discovery undergirds the Reds’ conviction, and they fear that man-made changes will forever render the question about native life on the planet unknowable. The Reds worst fear is realized as UNOMA approves the distribution of windmill heaters, and terraformer enthusiasts secretly, and illegally, seed the heaters with genetically engineered microorganisms (GEMs), polluting the possibility of ever knowing if Mars harbors life. Arkady notes that he and Nadia have become unwitting “Johnny Appleseeds” (Robinson, 1993, p. 191), inextricably linking them to Bradbury’s Benjamin Driscoll and home.

Empathizing with the Reds didn’t come naturally for many students. At least it appeared that way on the surface. Many that did see merit in the Reds’ position, or agreed with it, were willing to let hypothetical terraforming activities commence if cursory searches for life yielded negative or rudimentary results. If there was support for Ann’s view that we “value consciousness too high, and rock too little” (Robinson, 1993, p. 179), it was overshadowed by a sentiment more sympathetic to the Greens, once the possibility of life was deemed improbable or lowly-evolved.

The class dug into the details of terraforming via lectures based on *The Case for Mars*, and readings proposing less conventional means like *Terraforming Mars with Four War-Surplus Bombs* (Mole, 2002). When the tenor of the class suggested more of a focus on the *could we* aspects of the reading than the *should we*, we decided to challenge the students to explore the Reds’ position more deeply by adding readings from environmentalist Edward Abbey (1968, 1975). Abbey’s description of a similar earthly landscape, the American desert, seemed an appropriate way to ponder more about the value of wild places in a more familiar setting. His story of eco-terrorist tactics (1975) foreshadowed the sabotage in *Red Mars*. Like Abbey’s protagonists George Hayduke, Seldom Seen Smith, Bonnie Abzug, and Doc Sarvis, Martian settlers were willing to take drastic and

destructive action based on their convictions. Lastly, Arkady and Abbey seemed to be kindred spirits when it came to their views on government and big corporations. The following passage from Abbey (1989) would have flowed just as naturally from either man: “Anarchism is founded on the observation that since few men are wise enough to rule themselves, even fewer are wise enough to rule others” (p. 23). Although they would have disagreed vehemently about terraforming, an introduction and comparison seemed in order.

The final exam in the course took the form of a debate between the Reds and the Greens and provided the students with an opportunity to revisit and fortify their stance. To even up the teams (the Green sentiment seemed prevalent, or at least the most vocal), students were randomly assigned to each side. Several students told us later that they appreciated being forced to argue a side that conflicted with their own belief. Students designed the debate format and ground rules and developed the evaluation criteria. A spirited but respectful debate ensued. A significant portion of the dialogue focused on terraforming details and unknowns (*could we?*), but the latter half shifted to the *should we?* question.

The Greens cited scarcity and the necessary resources Mars could provide. The instructors found themselves secretly rooting for a counter punch in the form of an Abbey quote. While students enjoyed Abbey, several shared in course evaluations that they struggled to connect his ideas to the ethical questions raised by the prospect of terraforming, and Abbey never surfaced during the debate; however, the student Reds had found something more impactful and direct—*The Value of Wilderness* by William Godfrey-Smith (2008). The Reds pointed out that all the arguments ascribing value to Mars by the Greens did so from a human-centered perspective, a worldview we had seen humans wrestle with throughout the course. Using a mix of quotes and summary of ideas from the paper, the Reds ended the debate with hanging questions. Is it possible that Mars has intrinsic value, which is obscured by our anthropocentric view? Could our experiences both enable and interfere with deeper understanding? It was an appropriate way to end the course.

CONCLUSION

We have defined four elements in our pedagogical definition of SF and illustrated those elements using experiences from a first year seminar that mixed SF and science content. The four elements created a classroom that encouraged speculation and fostered the very habits of mind consistent with being a scientist. The science portrayed in *Red Mars* and other SF used in the class was plausible yet one step beyond current capabilities—satisfying the skeptics at the same time encouraging them to open their minds to new perspectives.

The course went beyond using a single work of SF to incorporate several selections spanning over a century of time. This historical progression of SF, matched to the historical development of our understanding of Mars, illustrated the nature of science. In the process, the very values necessary to become a scientist such as curiosity, imagination, and creativity, were exalted and the connections between science, technology, and society were richly explored based upon the SF

selected. As our student Alex stated, “Science fiction glorifies the men and women of the future—they invent, innovate, develop and think of new solutions. [Science] Research is about new discoveries, and about expanding frontiers—the unknown.” At the same time SF also highlights the potential downsides of unrestrained scientific “progress.”

The novums often created cognitive dissonance and presented an opportunity to examine how scientists and engineers resolve that dissonance. The stories also highlighted the fact that some of the dissonance generated by scientific speculation, such as the “should we?” questions raised during the terraforming debate, can’t be resolved by science alone. Ironically, SF simultaneously pushes our scientific boundaries and reminds us that science has its limits.

Speculative SF as a genre has at least a supporting role to play in the preparation of the undergraduate interested in the sciences. We believe this model could be extended to other science disciplines and speculative novels. Michael Crichton’s *Jurassic Park* or *The Andromeda Strain* would be examples that fit the four elements. SF, biographies, and other genres that include science as a theme can engage, enrich and extend the scientific knowledge learned within the science classroom and textbooks. “A love of reading produces a person who is literate. A love of reading science fiction produces a literate person open to new ideas, critically aware of the consequences of change, and ready for the future” (Czerneda, 2006, p. 42). For many students interested in science and engineering, SF is another source of nourishment that helps develop, sustain and motivate them in their pursuit.

REFERENCES

- Abbey, E. P. (1968). *Desert solitaire*. New York, NY: McGraw-Hill.
- Abbey, E. P. (1975). *The monkey wrench gang*. Philadelphia, PA: Lippincott Williams & Wilkins.
- Abbey, E. P. (1989). *A voice crying in the wilderness*. New York, NY: St. Martin’s Press.
- Abumrad, J., & Krulwich, R. (Hosts). (2008, March 24). *War of the worlds*. RadioLab. Podcast retrieved from <http://www.radiolab.org/2008/mar/24/>
- American Association for the Advancement of Science. (1990). *Science for all Americans*. New York: Oxford Press.
- Atwood, M. (2011). *In other worlds: SF and the human imagination*. New York: Nan A. Talese/Doubleday.
- Austin, B., Menasco, J., & Vannette, T. (2008). The nature of science in popular nonfiction. *The Science Teacher*, 75(5), 27-32.
- Barnett, M., & Kafka, A. (2007). Using science fiction movie scenes to support critical analysis of science. *Journal of College Science Teaching*, 36(4) 31-35.
- Bell, A. G. (1901, February 11). [Letter to Mabel Bell]. The Alexander Graham Bell Papers at the Library of Congress. Retrieved from http://memory.loc.gov/cgi-bin/query/P?magbell:11:./temp/~ammem_j7u7::
- Bell, A. G. (1909, November 29). [Letter to Mabel Bell]. The Alexander Graham Bell Papers at the Library of Congress. Retrieved from http://memory.loc.gov/cgi-bin/query/P?magbell:2:./temp/~ammem_j7u7::
- Bould, M., Butler, A. M., Roberts, A., & Vint, S. (Eds.). (2010). *The Routledge companion to science fiction*. New York: Routledge.

- Bould, M., & Mieville, C. (Eds.). (2009). *Red planets: Marxism and science fiction*. Middleton, CT: Wesleyan University Press.
- Bradbury, R. D. (1950). *The Martian chronicles*. New York, NY: Doubleday.
- Burroughs, E. R. (1917). *A princess of Mars*. Chicago, IL: A.C McClurg.
- Czerneda, J. E. (2006). Science fiction and scientific literacy. *The Science Teacher*, 73(2), 38-42.
- Ferguson, K. (2002). *Tycho & Kepler: The unlikely partnership that forever changed our understanding of the heavens*. New York, NY: Walker & Company.
- Firooznia, F. (2006 March/April). Giant ants and walking plants. *Journal of College Science Teaching*, 35(5) 26-31.
- Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford University Press.
- Fontenelle, B. (2008). *Conversations on the plurality of worlds*. (E. Gunning, Trans.). London: Tiger of the Stripe. (Original work published 1686).
- Freudenrich, C. (2000, November). Sci-fi science. *The Science Teacher*, 67(9), 42-45.
- Furman University. (2005). *Inigorating intellectual life: A proposal for Furman University's Academic Program and Calendar*.
- Godfrey-Smith, W. (2008). The value of wilderness. *Environmental Ethics*, 1(4), 309-319.
- Harris, S. (1977). *What's so funny about science?* Los Altos, CA: William Kaufmann, Inc.
- Hartmann, W. K. (2003). *A traveler's guide to Mars*. New York, NY: Workman Publishing.
- Huygens, C. (2010). *Cosmotheoros: The celestial worlds discovered – New conjectures concerning the planetary worlds, their inhabitants, and productions*. Farmington Hills, MI: Gale ECCO. (Original work published 1698.)
- Jacobson, T. (Producer), & De Palma, B. (Director). (2000). *Mission to Mars* [Motion picture]. United States: Touchstone Pictures.
- Kilby-Goodwin, K. (2010). Putting the 'science' in 'science fiction.' *The Science Teacher*, 77(5) 60-63.
- Kimbell, W. (Director). (1957, December 4). Mars and Beyond [Television broadcast]. In *Disneyland*. Burbank, CA: Disney.
- Kincaid, P. (2010). Against a definition of science fiction [Electronic version]. *World Literature Today*, 84(3).
- Klein Dytham Architecture. (n.d.). *PechaKucha frequently asked questions*. PechaKucha 20x20. Retrieved from <http://www.pechakucha.org/faq>
- Laprise, S., & Winrich, C. (2010). The impact of science fiction films on student interest in science. *Journal of College Science Teaching*, 40(2), 45-49.
- Lowell, P. L. (1895). Mars. III. Canals. *The Atlantic Monthly*, 76 (July 1895), 106-119.
- Lowell, P. L. (1906). *Mars and its canals*. New York, NY. Retrieved from <http://archive.org/details/marsitscanals00loweuoft>
- Markley, R. (2005). *Dying planet: Mars in science and the imagination*. Durham, NC: Duke University Press.
- Mirisch, W. (Producer), & Selander, L. (Director). (1951). *Flight to Mars* [Motion picture]. United States: Monogram Pictures.
- Mole, R. A. (2002). Terraforming Mars with four war-surplus bombs. In R. Zubrin (Ed.), *On to Mars: Colonising a new world* (pp. 134-137). Burlington, Ontario: Apogee Books.
- Morrison, H. (Reporter). (1937, May 6). *Hindegurg disaster* [Radio broadcast]. Lakehurst, NJ: WLS Chicago. Retrieved from <http://archive.org/details/SF145>
- National Academy of Sciences. (2013). *The science & entertainment exchange*. Retrieved from <http://www.scienceandentertainmentexchange.org/>
- National Research Council. (1996). *National Science Education Standards*. National Academy Press: Washington D.C.
- National Research Council. (2012). *A framework for K-12 Science Education: Practices, crosscutting concepts and core ideas*. National Academy Press: Washington D.C.
- Pisaturo, R. (2002). First on Mars should own it. In R. Zubrin (Es.), *On to Mars: Colonising a new world* (pp. 211-216). Burlington, Ontario: Apogee Books.
- Roach, M. (2010). *Packing for Mars: The curious science of life in the void*. New York, NY: Norton.

- Robinson, K. S. (1993). *Red Mars*. New York: Bantam Books.
- Roberts, A. (2005). *The history of science fiction*. New York, NY: Palgrave Macmillan.
- Sagan, C. (1980). *Cosmos*. New York: Random House.
- Sagan, C. (1985). *Contact*. New York: Simon & Schuster.
- Sagan, C. (1996). A Message to Future Humans on Mars. Retrieved from <http://www.carlsagan.com/media/GreetingSagan64k.mp3>
- Saul, E. W. (Ed.). (2004). *Crossing Borders in literacy and science instruction*. Arlington, VA: NSTA Press.
- Schenck, A. (Producer), & Haskin, B. (Director). (1964). *Robinson Crusoe on Mars* [Motion picture]. United States: Paramount Pictures.
- Silver, J. (Producer), Wachowski, A. (Director), & Wachowski, L. (Director). (1999). *The matrix* [Motion picture]. United States: Warner Bros. Pictures.
- Strauss, M. (2012). Ten inventions inspired by science fiction. *Smithsonian.com*. Retrieved from <http://www.smithsonianmag.com/science-nature/Ten-Inventions-Inspired-by-Science-Fiction.html>
- Suvin, D. (1979). *Metamorphoses of science fiction: On the poetics and history of a literary genre*. New Haven: Yale University Press.
- Taylor, F. W. (2010). *The scientific exploration of Mars*. Cambridge, UK: Cambridge University Press.
- Wallace, A. R. (1907). Is Mars habitable? A critical examination of Professor Lowell's book "Mars and its canals," with an alternative explanation. Retrieved from <http://www.gutenberg.org/ebooks/10855>
- Wells, H. G. (1997). *The war of the worlds*. Mineola, NY: Dover Publications. (Original work published in 1898.)
- Welles, O. (Director). (1938, October 30). *The war of the worlds*. [Radio broadcast]. New York, NY: CBS Radio. Retrieved from <http://archive.org/details/OrsonWellesMrBruns>.
- Zubrin, R. (1996). *The case for Mars: The plan to settle the red planet and why we must*. New York, NY: Touchstone.