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The Oxford Handbook of SCIENCE

THE OXFORD HANDBOOK OF

SCIENCE FICTION

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SCIENCE FICTION

Edited by ROB LATHAM

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THE OXFORD HANDBOOK OF

SCIENCE FICTION

INTRODUCTION

THE problem for science fiction studies for much of its early history as an academic discipline essentially involved determining the nature and boundaries of its putative object, deciding *what counts* as science fiction (SF). Broadly speaking, for the first two decades of its existence most scholarly work on SF tended to take three forms: theoretical efforts at definition that established the historical compass of the genre and elicited a canon of major works (see, for example, Alkon and also Malmgren); formalist studies that traced important iconic or ideational features of the field (see, for example, Wolfe); and critical investigations that purported to show the alignment of science fiction with specific trends in literary-cultural theory, such as feminism (see, for example, Wolmark). For all their many differences in orientation and emphasis, these approaches tended to treat SF as a more or less fixed genre, whether defined discursively (in terms of narratological features), theoretically (in terms of epistemological structures), or institutionally (in terms of publishing categories). The overall thrust of this body of work was to argue for SF as a significant form of modern literature that raised consequential issues and intersected with major modes of criticism.

The evolution of such a problematic is entirely understandable in context, given the recentness of SF's entry into the academy. The first serious effort at a comprehensive bibliography of the English-language genre was Everett F. Bleiler's Checklist of Fantastic Literature, published in 1948, a year after the first book-length survey of the field, J. O. Bailey's Pilgrims in Space and Time: Trends and Patterns in Scientific and Utopian Fiction, appeared. The first dedicated journal, Extrapolation, was founded in 1959, colleges and universities started offering regular courses in SF in the early 1960s (see Hillegas), and academic presses began featuring studies specifically of science fiction as opposed to utopian literature, the imaginary voyage, fiction anthologies with critical commentary, or works on major authors such as H. G. Wells—in the 1970s (see Ketterer; Rose; and Philmus, Unknown). In the early decades of its existence, SF studies was under significant critical and institutional pressure to both delimit and legitimate its subject matter. As Robert Philmus remarked in 1973, in the very first issue of the journal Science Fiction Studies: "Generic names must mean something. The problem SF poses in this regard is that its name . . . does not in itself and by convention evoke the 'shape' and identity of what it designates; and because it does not, what science fiction designates must be identified-that is, stipulated" ("Shape" 37; emphasis in original). Moreover, as Edward

James points out in his survey of early SF criticism, the process of devising definitions and constructing a historical canon tended to function to "giv[e] modern SF writers a respectable ancestry" and thus "greater respectability in the halls of academe" (32–33).

The signal accomplishment of these initial decades, in terms of scope and influence, was unquestionably Darko Suvin's Metamorphoses of Science Fiction (1979). Suvin's definition of SF as "a literary genre whose necessary and sufficient conditions are the presence and interaction of estrangement and cognition" (7-8; emphasis in original); his claim that this estrangement was achieved primarily through "the narrative dominance or hegemony of a fictional 'novum' (novelty, innovation) validated by cognitive logic" (63; emphasis in original); and his historical conspectus tracing the genre's origins to Thomas More's Utopia (1516) and Jonathan Swift's Gulliver Travels (1726) enshrined a very specific and compelling vision of SF: it was a literary form that functioned to defamiliarize, critique, and/or satirize present-day reality through the projection of alternative worlds, an effect accomplished through the mobilization of both technoscientific methods ("cognitive logic") and objects ("fictional 'novum[s]"). Suvin's conception had the virtue of rigor and clarity, its epochal intervention registered by the rampant italics he used throughout the book to underline his key ideas. Yet it was also, as several critics have pointed out, narrowly prescriptive and sociopolitically tendentious. In the words of Istvan Csicsery-Ronay Jr., "[m]any of SF's most typical novums [such as time machines] are only ostensibly scientifically rational" (73), and Patrick Parrinder has observed that Suvin's central assumption that true SF must necessarily be socially critical "turns the text's function of 'commenting on the author's collective context' into the measure of aesthetic achievement" (47). Surely, there is something curious about a definition of SF that, by Suvin's own admission, rules out the vast majority of texts published and consumed as such-especially the American magazine tradition-as insufficiently cognitive, or insufficiently estranging, or both.

Despite its shortcomings, Suvin's definition of the genre has exerted an enormous influence on subsequent critics, and there can be little doubt that the Suvinian model has produced trenchant and compelling studies of the work of authors such as Wells, Stanisław Lem, Karel Čapek, and Ursula K. Le Guin, among others. But as this list suggests, the canon it has generated has been a fairly narrow one, often unapologetically so. In his book Critical Theory and Science Fiction (2000), Carl Freedman, Suvin's most significant contemporary follower, asserted that the pulp tradition was an unfortunate distraction from the main line of true SF, which descended from the classical utopia through Wells to major "literary" writers such as Le Guin and Samuel R. Delany, and that the ongoing legacy of pulp SF "continues to obscure the critical vitality of the genre" (90). This vitality lay in science fiction's ability to "foreground and demystify the actual, and thereby to point to some authentic plenitude with which the deprivations of mundane reality are contrasted" (72); works that failed to accomplish this heady mission were necessarily inferior, if they even deserved the name of "science fiction" at all. For his part, Suvin had called pulp SF a "misshapen subgenre," more or less indistinguishable from "supernatural or occult fantasy," whose perpetuation and popularity were merely "the result of an ideological or commercial habit" (68).

Yet another consequence of the dominance of Suvin's approach in the early decades of academic SF studies was a general neglect of science fiction in other media. In his award-winning essay "Kubrick's 2001 and the Possibility of a Science-Fiction Cinema," Freedman argued that SF film was essentially impossible given the dominance of special effects over "literary quality" within the medium, especially its Hollywood incarnation. Indeed, only those rare films that managed to sustain "a close alliance . . . to literary science fiction" achieved anything like the "critical and oppositional potential" of which the genre was capable (312). In short, SF films substituted technological spectacle for genuine cognitive estrangement. The journal Suvin co-edited, Science Fiction Studies, generally scanted coverage of film, television, and other forms of mass-media SF in its early years, the title of its November 1980 special issue, "Science Fiction and the Non-Print Media" (published the year that Suvin stepped down from the editorial board), only serving to underscore this omission with a belated effort at inclusion. Even the articles in this special issue, as the lead editorial proclaimed, functioned "to 'demythologize'... the images the visual media present us with" ("Editorial" 246), rather than seeing those images as themselves authentic vehicles of demythologization, as the novums of literary SF would be. A significant result of this marginalization of nonprint science fiction was that a separate discourse about SF film, more or less segregated from SF studies proper, developed within the discipline of cinema studies, beginning in 1980 with Vivian Sobchack's pioneering study The Limits of Infinity: The American Science Fiction Film, 1950–1975 and continuing with Constance Penley's 1986 special issue of Camera Obscura on "Science Fiction and Sexual Difference" (eventually published as Close Encounters: Film, Feminism, and Science Fiction in 1991). A few critics attempted to bridge this divide—for example, Brooks Landon, who asserted in 1992 that "to expect SF films ... to pursue only the same goals as does SF literature is ... critically narrow-minded" (Aesthetics 8)-but they were decidedly in the minority. It was not until 2008 that a journal devoted specifically to Science Fiction Film and Television would appear (though Science Fiction Studies did, especially after 1990, become more catholic in its coverage of mass-media SF).

The critical hegemony of the Suvinian paradigm began to be effectively challenged by the rise of cultural-studies perspectives in the 1980s and 1990s. Less concerned with normative definitions and literary canons than with the varying and contradictory ways that the genre had been configured at particular historical moments, cultural-studies scholarship tended to see SF as in constant dialogue with other forms of cultural production, as well as with unfolding events in social and political history. More specifically, cultural-studies work focused on connections between the genre and the many formal and informal discourses that made up nineteenthand twentieth-century "technoculture"—that complex of institutions and attitudes, predictions and inventions linking high-tech research with popular culture. Technoculture studies brought together issues and contexts related to the industrial production, textual refraction, and sociopolitical deployment of technological advances; and SF had a central place within this corpus, given its longstanding history of tracking the futuristic fallout of technoscientific "progress." As a form of literature devoted, in large part, to evoking the potential futures and possible worlds engendered by mechanical innovation, SF emerged, so these critics claimed, as the preeminent site within Euro-American popular culture, where the vast social impact of modern technology could be creatively explored and critically interrogated.

Important works in the cultural study of SF powerfully displayed the genre's unparalleled capacity to illuminate the technological culture that had radically transformed modern life. H. Bruce Franklin's War Stars: The Superweapon and the American Imagination (1988), for example, showed how the technophilic perspectives of classic pulp SF converged with the imperatives of the militarist state to sanction the high-tech warfare of the postwar atomic age. Similarly, Andrew Ross's Strange Weather: Culture, Science and Technology in the Age of Limits (1991) analyzed the implication of SF in two key events in the history of modern technoculture-the "enlightened technocracy" movement of the 1920s, with which early SF was affiliated through the career of science popularizer Hugo Gernsback (editor of the first SF pulp, Amazing Stories), and the computer counterculture of the 1980s, which cyberpunk SF both championed and critiqued. Indeed, cyberpunk and its affiliated cybercultures were at the center of much of this early cultural-studies work. Scott Bukatman's Terminal Identity: The Virtual Subject in Postmodern Science Fiction (1993), for example, argued for cyberpunk as a quintessential postmodern genre, defining it broadly enough to include not only print SF by the likes of William Gibson but also films, graphic novels, and even theme parks. And N. Katherine Hayles's How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics (1999) showed how major SF texts since the 1950s—including the work of cyberpunk authors such as William Gibson-had participated, along with postwar cybernetics theory and recent innovations in artificial intelligence and artificial life research, in formulating a "posthumanist" cultural paradigm.

This spate of fresh critical-historical work, emanating largely from scholars of American studies, visual culture studies, and science and technology studies, may seem to have developed in relative isolation from the tradition of classical SF studies pioneered by Suvin (only Bukatman and Hayles mention his work, in passing). Yet both schools are deeply rooted in Western Marxist thought, though their specific debts and therefore critical emphases vary. Where Suvin adapted Brechtian ideals of estrangement and Ernst Bloch's notion of the utopian novum, cultural-studies theorists returned to the Gramscian concept of hegemony and the critiques of popular culture pioneered by Raymond Williams and the Birmingham School. What made the late 1980s and early 1990s a turning point in SF criticism was what appeared at the time to be the signal accomplishment of cyberpunk, which emerged as a trenchant form of postmodern discourse that offered compelling futuristic visions of the intersection of corporate power and global technoculture. Fredric Jameson, for example, called the subgenre "the supreme literary expression, if not of postmodernism, then of late capitalism itself" (418 n1; emphasis in original). In 1988 the Mississippi Review released a special issue on cyberpunk edited by Larry McCaffery, which was eventually published in book form as Storming the Reality Studio: A Casebook of Cyberpunk and Postmodern Fiction (1992) and featured the work of a new generation of SF scholars such as Csicsery-Ronay, Landon, David Porush, and Veronica Hollinger.

When Csicsery-Ronay and Hollinger joined the new editorial board of *Science Fiction Studies* in 1991 (along with Arthur B. Evans and Richard D. Mullen, who had originally founded the journal), the transition away from the Suvinian paradigm seemed complete. Yet there was still significant shared ground thanks to their mutual roots in Marxist critical theory, and the cultural study of SF came to adopt, in modified form, some of Suvin's key ideas—in particular, his emphasis on the centrality of an estranging novum linked to technoscientific development (see Csicsery-Ronay 47–75)—while shedding the more problematic baggage of formalist genre studies, especially its inclination to construct narrow and exclusionary canons. Moreover, contra Suvin, for whom works of science fiction were either cognitively estranging and therefore socially critical or else reactionary deformations, technoculturally oriented SF studies operated with an understanding that SF can be at once critical of *and* complicit with the technological culture with which it is inextricably entwined.

The development of SF criticism since the 1990s is thus marked by both rupture and continuity, yet technoculture studies has clearly made possible significant new ways of understanding the history of SF. Roger Luckhurst's 2005 "cultural history," for example, melds an internal survey of the genre's characteristic institutions and textual strategies with an external focus on the cultural politics of technological development; indeed, the chief accomplishment of his book is to render such facile inside-outside distinctions moot, since a genuine cultural history requires meticulous attention to both genre adaptation and technosocial transformation. Luckhurst's book shares with the aforementioned works of Franklin, Bukatman, Ross, and Hayles a perspective that persistently moves past the borders of genre to trace larger systems of meaning-making in which technology has a central-if not preeminent-place. While Luckhurst's focus remains largely on SF literature, technocultural studies of SF have often had a multimedia orientation, breaking the stranglehold on literary studies that had marked the discipline for its first two decades. As noted above, Bukatman's book found examples of cyberpunk in texts ranging from the film TRON (1982) and the TV movie Max Headroom: Twenty Minutes into the Future (1985) to Howard Chaykin's comic book American Flagg! (1983-88) and Disney's Tomorrowland. And recent works of reference in the field have taken note of this shift, with The Routledge Companion to Science Fiction (2009), edited by Mark Bould et al., featuring chapters not just on SF literature, but on film, television, and comics-even a chapter "SF Tourism" by Landon.

Indeed, if the problem for SF studies in the 1970s was to establish what counts as science fiction, the problem today is to determine *what does not count* as science fiction. *The Oxford Handbook of Science Fiction* takes up this critical challenge, attempting to descry the historical and cultural contours of SF in the wake of technoculture studies. Rather than treating the genre as an isolated aesthetic formation, it examines SF's many lines of cross-pollination with technocultural realities since its inception in the nineteenth century, showing how SF's unique history and subcultural identity have been constructed in ongoing dialogue with popular discourses of science and technology. Moreover, the scope of what qualifies as science fiction is also expansive, encompassing not only literary texts but also speculative technocultural work in a

wide range of media. The scope of SF's sociocultural influence has never been greater, almost keeping pace with the magnitude of technological change itself. As cyberpunk author Bruce Sterling pointed out in 1986, his generation was the first "to grow up in . . . a truly science-fictional world"; as a result, "the techniques of classical 'hard SF'—extrapolation, technological literacy—are not just literary tools, but an aid to daily life" (xi). This *Handbook* acknowledges this extraordinary explosion and proliferation of science-fictional texts and modalities, which have made SF today less a genre than a way of being in the world. As Landon puts it, SF is now "the new realism of technological society," a "meta-genre so broad and so pervasive as to be a concept and force quite outside the boundaries of fiction, and of art itself" (*Science Fiction* xiii). In Csicsery-Ronay's words, "science-fictionality" has becomes nothing less than "a way of thinking about the world" (ix).

This volume consists of four broadly themed parts, each divided into eleven chapters. Part I, "Science Fiction as Genre," considers the internal history of SF literature, examining its characteristic aesthetic and ideological modalities, its animating social and commercial institutions, and its relationship to other fantastic genres. Part II, "Science Fiction as Medium," presents a more diverse and ramified understanding of what constitutes the field as a mode of artistic and pop-cultural expression, canvassing extra-literary manifestations of SF ranging from film and television to video games and hypertext to music and theme parks. Part III, "Science Fiction as Culture," examines the genre in relation to cultural issues and contexts that have influenced it and been influenced by it in turn, the goal being to see how SF has helped to constitute and define important (sub)cultural groupings, social movements, and historical developments during the nineteenth, twentieth, and twenty-first centuries. Finally, Part IV, "Science Fiction as Worldview," explores SF as a mode of thought and its intersection with other philosophies and large-scale perspectives on the world, from the Enlightenment to the present day. The topics covered in these four parts are designed to be exemplary rather than exhaustive, treating a selective but significant array of issues that, taken altogether, communicate a rich sense of SF as a literary, artistic, pop-cultural, social, and ideological formation.

In other words, this is not a comprehensive work of reference designed to survey the field systematically or to summarize consensus views. The chapters do have some overview function, and their range is designed to present a representative sample of relevant topics in the four areas covered; but their purpose is generally more argumentative than expository, seeking to intervene in current debates and to broaden the scope of what usually counts as science fiction. While each chapter is designed to stand on its own, there is inevitable overlap among them in terms of contextual information presented and specific texts cited. The overall effect, I hope, is to convey a strong sense of the heterogenous discourses and debates, histories and cultures, that have gone to make science fiction, broadly conceived, what it is today.

Part I opens with Brooks Landon's careful anatomy of two key terms in SF critical discourse: extrapolation and speculation. The former is generally seen as indexing the genre's predictive capacity, while the latter is taken to refer to its more visionary

tendencies; in other words, they are two contrasting ways of understanding the essential narrative logic of the genre. Yet, as Landon shows, the actual evolution of these ideas within SF discourse has been considerably more confused and contradictory, with critics sometimes conflating the terms while at other times seeing one as a derivation or subset of the other. These critical peregrinations, Landon argues, have been linked to shifts in the relative status of scientific "plausibility" and thus to debates over the centrality of science itself to an understanding of the genre. The second chapter, by Peter Stockwell, moves from debates over the ideological function of SF narratives to a focus on their aesthetic modalities. SF, Stockwell asserts, has been traditionally associated with the sublime due to its vaunted appeal to the reader's "sense of wonder"-an association that has damaged the genre's critical standing given the influence of Kant's disparagement of the category of the sublime in favor of the beautiful. Stockwell turns to recent work in the area of cognitive aesthetics in order to recast the way SF's artistic value is understood, ultimately seeing SF as an "immersive" literature whose linguistic and narratological allure lies in placing the reader in "a position of assumed familiarity with the imagined world."

Just as Landon and Stockwell take issue with prevailing critical models for understanding SF's narrative operations, so Arthur B. Evans contests some of the ways its history has traditionally been constructed. Evans presents a three-stage history of SF historiography that, in its final two stages, roughly correlates with the distinction drawn in this Introduction between a genre-studies model and a cultural-studies model: before 1970 (during the prehistory of academic SF criticism per se), histories tended to focus on authors or themes, at which point there was a shift to more "semiotic" approaches devoted to analyzing the characteristic "protocols" of the genre, followed by a move toward "sociological" histories that viewed SF as an expression of prevailing sociocultural trends. Cutting across these divisions were the "origin stories" that SF historians told about the roots and evolution of the genre; again tallying with claims made in this Introduction, Evans shows how earlier SF histories-produced during the period of the genre's academic legitimation-devoted a significant portion of their attention to prestigious British ancestors such as Shelley and Wells, whereas more recent histories have focused on the legacy of the American pulp genre during the twentieth century and after. Gary K. Wolfe's chapter builds on Evans by analyzing the consolidation of a conventional view of SF history as a series of literary movementsthe hard SF of the 1940s, the 1960s New Wave, cyberpunk in the 1980s, and so on. Yet these movements were not all of a piece: some were genuine alliances of editors and authors with a common purpose, whereas others were more amorphous groupings or even retrospective projections.

The next two chapters, by Farah Mendlesohn and Gary Westfahl, focus on two important institutions supporting SF as a commercial genre: fandom and the literary marketplace. Mendlesohn gives a sense of the global scope of SF fandom, as well as the complex bureaucracy that has evolved to sustain its plethora of conventions, publications, and awards, ultimately arguing for fandom as a "knowledge economy" that privileges seniority of experience as a way of nurturing institutional memory. For his part, Westfahl shows how US science fiction, despite developing within a strong market milieu, has always spawned authors and editors who chafed at prevailing commercial norms for SF storytelling, pushing for innovation and diversity in a context where market pressures tended toward the crystallization of repeatable formulas. In Westfahl's view, this struggle has been settled definitively in favor of the marketplace, and "authors still striving to produce provocative, original science fiction . . . are becoming a disregarded minority, with little impact on the genre."

Following this pair of chapters are three that discuss dominant modalities of generic expression. Jess Nevins argues that "pulp SF" is actually a more capacious category than has traditionally been assumed, encompassing not merely work in magazines specifically designated as "science fiction" but also a vast amount of material published in the general pulps; if the latter were taken into account to a greater degree by critics and historians, pulp SF would be viewed in a considerably different light, seen as more pessimistic in its treatment of technoscientific topics and more complex in its depiction of women and nonwhite characters. Joan Gordon analyzes the development of "literary" science fiction into three main groupings: SF that foregrounds the specific aesthetic qualities characteristic of the genre, SF that mimics some of the styles of writing of the literary mainstream, and SF that prominently alludes to works of canonical literature. All three approaches, she suggests, are converging in an era of rampant technological change and saturation. Victoria de Zwaan's chapter addresses the "postmodernization" of SF during the cyberpunk era, showing how Bruce Sterling's category of "slipstream," while theoretically incoherent, continues to appeal to critics as a way of registering the ongoing hybridization between SF and experimental writing.

The final two chapters in Part I serve to unsettle the category of science fiction itself, opening our understanding of the genre to a range of literary techniques and cultural manifestations. Brian Attebery demonstrates how SF has always had a strongif uneasy-relationship with fantasy, with many of its most characteristic narrative devices, from time machines to faster-than-light travel, having little warrant in actually existing science. As Attebery observes, this intermingling with fantasy renders problematic some of the core assumptions of Suvinian genre theory, which draws a sharp line between these forms; the "incursion of the fantastic" into an SF text complicates the status of science fiction as "a vector for disseminating scientific ideas or as a mode of social critique." Attebery proposes replacing conventional genre theory, concerned as it is with the clear demarcation of borders, with a more fluid sense of SF as a spectrum of possibilities characterized by the varying intensity of the copresence of fantastic elements. Veronica Hollinger goes further, arguing that SF perhaps no longer deserves to be seen as a genre at all; instead, it may now be a mode, a method of "thinking and speaking about contemporary reality so that SF becomes integrated with other discourses about late-capitalist global technoculture." Echoing the general perspectives of this Handbook, Hollinger claims that the traditional view of SF as a settled genre formation has become increasingly untenable as "contemporary reality and science fiction have become inextricably bound up with each other."

Hollinger's argument, positioned at the end of the first part, opens the critical conversation to include the media modalities in which SF finds expression, which is the subject of the chapters in Part II. The chapters proceed from more familiar media forms of SF, such as film and television, which already have fairly well-developed critical discourses surrounding them, to forms that have long been recognized as having a significant relationship with the genre-such as comics and video games-but have not been extensively treated in the extant scholarship, to forms that have seldom been considered in relation to SF at all, such as music, performance art, and architecture. Mark Bould's chapter on film addresses the continuing marginalization of mass-media forms in SF studies, seeing this as a legacy of the academic legitimation crisis of the discipline's early decades. Yet he also shows the limitations of a genre-based model in general, even in SF film studies: the "purifying, categorizing impulse" it expresses is inadequate to grapple with the "fluid and tenuous discursive constructions" most films are, especially today. In particular, the distinction between cognition and affect-so central to Suvin's model and to understandings of the distinctions between SF and horror film-needs to be rethought in an era when special effects may have complex ways of addressing viewers, encoding significant critical information. J. P. Telotte's chapter on radio and television sets a pattern for a number of the chapters to come, showing how these media were not peripheral but central to twentieth-century SF history. Citing pulp pioneer Hugo Gernsback's career as a popularizer of radio technology, Telotte argues that these "new, science-fictional media would not only provide powerful platforms for staging tales of scientific imagination, but also forms that would, self-consciously, draw the media into their exploring and contesting of the genre's nature."

Paul Wells pursues a similar argument, seeing animation as a "thick text" whose technocultural elements have an inherently science-fictional quality. Historically, animation functioned as "a new way of seeing, a modern engagement with the simultaneity of the emergence of new science and technology with fresh codes and conditions of visual interpretation." Its affective tone of "enchanted rapture" made it uniquely suited to serve as a kind of self-reflexive embodiment of SF's mission to chronicle the experiential effects of change, from Segundo de Chomón's use of stop-motion techniques to depict "the magical technologies of electrically imbued objects" to Pixar Studios' deployment of CGI to register the wonder of "scientific and technological interfaces with human creativity." Jerome Winter's chapter points to the paucity of serious scholarship on SF art and illustration, "not simply as a supplement to the history of SF literature, but as a significant shaper of the image culture of twentieth-century technological modernity." Winter analyzes the impact of SF visual art—in a number of formats, including pulp magazine covers, film promotional art, album sleeve design, and digital illustration-in helping to shape modern technocultural consciousness in ways that have been arguably more pervasive and influential than the impact of SF literature itself. Similarly, Corey Creekmur's chapter essays an "alternative history" of science fiction in which comic strips and comic books are accorded a more central place, in terms of both the sheer quantity of their output and their enormous and ongoing popularity (not to mention their outsized influence, in recent years, on other forms of SF media). For example, the figure of Buck

Rogers, incubated in the SF pulp *Amazing Stories*, went on to have a long career in newspaper (and subsequently film) serialization, doing more to disseminate science-fictional imagery among a mass audience than the specialized SF magazine culture that spawned him. Creekmur considers more contemporary examples as well, from Osamu Tezuka's wildly popular manga *Astro Boy* (1952–68) to more sophisticated graphic novels such as Warren Ellis and Darick Robertson's *Transmetropolitan* (1997–2002).

Three pairs of chapters follow, examining SF in digital media (video games, digital arts and hypertext), performance-based media (music, performance art), and media of the built environment (architecture, theme parks). Paweł Frelik's chapter on video games continues the argument for moving forms of visuality to the center of SF critical discourse; indeed, it makes an ambitious argument seeking to displace the presumed superiority of print SF in mediating the genre's key strengths (such as the depiction of alternative worlds or the critique of present-day reality), which, Frelik claims, visual-culture modes of expression can display just as-if not more-powerfully. Moreover, the close historical connection between the medium and SF themes and ideas—one of the earliest video games was Spacewar! (1962), which was adapted into the first arcade game Computer Space (1971)—has ensured that SF video games would not suffer the relative marginalization that SF has in other media, including visual media such as film and television, thus allowing it to become one of the prime vehicles for popular experiences (and understandings) of technological interactivity and simulation. James Tobias finds a similar connection between medium and SF in the representational and haptic strategies of digital textuality: both are "allegorical index[es] of technocultural change" that operate across a spectrum from the utopian to the dystopian. Tobias analyzes the "discursive performativities of utopian program-asnarrative" in a range of digital forms, from hypertexts to museum installations to web-based narratives, identifying potent critiques of instrumentalized technoscientific agency in the ludic power of their interfaces.

John Cline's chapter expands the scope of what counts as "science fiction music" from SF film soundtracks, which are already the subject of some scholarship, to critically neglected forms such as popular songs whose lyrics express SF themes, as well as musical instruments-in particular, the Theremin and other electronic modalitieswhose technological substrate makes them inherently science-fictional. Like prevailing treatments of SF music, scholarship on performance art within technocultural SF studies is rather skewed, with certain key figures-such as Stelarc or Orlan-tending to be highlighted due to the science-fictional nature of their cyborg personae, at the expense of a more wide-ranging consideration of the links between the medium and SF. While providing insightful commentary on the careers of these two artists, Steve Dixon's chapter goes further, arguing for an intimate aesthetic and ideological connection: performance art "inhabits an interesting, tension-filled liminal space that is precisely science fiction. This space, like popular SF notions of outer space, mixes a reality of the known here-and-now with a 'will' to the unknown, the alien, and the future" (emphasis in original). The ritualized and affecting technocultural spectacles in SF performance art, Dixon asserts, especially those of cyborgized bodies and machinic

transformations, powerfully activate the cognitive estrangement Suvin locates at the heart of the genre. Nic Clear's chapter on architecture is similar to Cline's on music and Dixon's on performance art in that all three seek to shift the focus from a finding of SF themes in the medium to a consideration of the medium's inherent science-fictionality. Like Dixon, Clear borrows a key concept from Suvin-"the novum"-to explain the aesthetic and ideological power of architectural novelties, ranging from the ambitious utopian technoscapes of Futurism and Constructivism to the more playful Pop visions of the Archigram Group. Clear provocatively claims that contemporary science-fictional architecture-including the "liquid architectures" of cyberspaceoperates as a compelling critique of the profession's entrenched technocratic corporatism. By contrast, Leonie Cooper finds, even in the most corporate of architectural forms, the Disney theme parks, a series of "transitional spaces" and "ambiguous zones" whose liminality allows a "science-fictional mode of engagement" with the popular imaginary of the future. In short, the theme park "can become a kind of prophetic tool for forecasting a future that is already predestined by its simulations, or it can become evidence that the future must be imagined in ways other than how it has already been imagineered by theme-park designers."

Cooper's chapter, with its consideration of the theme park as a cultural as well as a medium-specific form, could readily have been included in Part III of this Handbook, "Science Fiction as Culture," which canvasses cultural phenomena or formations that have a clear relationship with SF and/or a strong science-fictional component. Taken overall, the chapters convey a sense of the range of ways that cultural values and practices have been informed or inflected by modern technoscience. As Sherryl Vint points out in her chapter on the culture of science, the "staying power of the term 'science fiction,' which stubbornly resisted displacement by the more evocative and perhaps more accurate 'speculative fiction,' suggests that something about the culture of science remains at the genre's core" (emphasis in original). She examines not only the presence of SF in scientific culture but also the genre's role in mediating "science" as an institution or a set of ideas to the public at large, as well as the influence of scientistic assumptions on the theorization of SF's narrative dynamics by, for example, Darko Suvin. Deploying perspectives from the sociology of science, Vint argues for SF as "a supplement to the official discourses of science," registering the ways in which technoscience, rather than being the disinterested intellectual pursuit one might imagine it to be, is always encountered precisely in and as a cultural form, saturated with cultural assumptions and values. Roger Luckhurst's chapter on the culture of automation provides a case study of Vint's basic claims, exploring the ways that forms of industrial and cybernetic automation encoded a technocratic worldview with effects not only on the kinds of SF stories that could be told but also on popular modes of self-understanding and ways of life. Luckhurst excavates a prehistory of modern automation in the eighteenth-century culture of clockwork automata and in the nineteenth-century Industrial Revolution, attending at once to their cultural fallout and their crystallization in early SF texts. Just as Wells's The Time Machine (1895), with its degeneration of the human race into two starkly opposed classes, is an allegory of the long-term effects

of automated routines of industrial production and consumption, so in the twentieth century the *Terminator* films (1984, 1991, 2003) explore the dire prospects of cybernetic automation systems that reduce human agency to a mere feedback process.

The next two chapters examine a particular post-World War II technocultural complex that has had a profound impact on the SF genre but whose dissemination to the public at large has also been deeply science-fictional. Steffen Hantke's chapter studies the reciprocal militarization of SF and science-fictionalization of military culture, particularly in the postwar period, which produced both a popular sci-fi movie called Star Wars (1977) and a system of nuclear deterrence—the Strategic Defense Initiative—that was popularly dubbed with the same moniker. As Hantke demonstrates, the sheer volume of the US defense budget during these decades inevitably impacted public culture in significant ways, making it more or less "explicitly militaristic" (emphasis in original). As a result, military imagery and values became "an indispensable part of the national imaginary," manifesting in a range of media, from films and television programs to first-person shooter video games. David Seed likewise shows the cultural ramifications of atomic technology and the "space race" during the immediate postwar decades, in familiar SF novels and films but also in comics, animation, and popular music that is relatively obscure today. Since postwar technoscientific achievements in these areas had been prefigured in the SF pulps decades earlier, a major consequence of their realization was to usher the genre "[f]rom a place of cultural marginality" to "a central position ... as a source of fictional and cinematic representations." Gregory L. Reece's chapter explores some of the subcultural effects of this postwar technocratic regime in the rise of cult belief systems with a strong science-fictional flavor, from the writings of UFO contactees to fringe religions such as the Heaven's Gate and Raëlian movements. The phenomenon with the deepest genre roots was clearly Dianetics (later the Church of Scientology), which was founded by erstwhile pulp SF writer L. Ron Hubbard.

A focus on the cross-over traffic between mainstream culture and marginal subcultures marks a number of the remaining chapters in this part. Jonathan M. Woodham's chapter on midcentury advertising and design positions itself at the interface between pulp and mass imagery, showing how science-fictional iconography and themes were absorbed into mainstream marketing culture through the mediation of popular spectacles like GM's Motoroma, Futurama, and Kitchens of Tomorrow exhibitions, "powerful three-dimensional futuristic advertisements that consumers likened to a science-fictional world depicting new concepts of domestic lifestyles, interior spaces, and technology." While a few rare SF novels-most famously, Frederik Pohl and C. M. Kornbluth's The Space Merchants (1953)-commented satirically on the metastasizing of this marketing culture, the vast amount of traffic went in the opposite direction, with the genre pouring its image repertoire into the popular consciousness in the form of "science-fictional stylings" and language (for example, Dynaflow, Thermopane) that evoked a future of easeful leisure and mechanized abundance. It is precisely this vision of the future against which postwar countercultures such as the Beats and hippies, which I treat in my chapter, rebelled. These countercultures, as I show, drew upon a different set of genre resources for their inspiration, specifically the social utopianism of SF texts and SF fans' sense of possessing a privileged form of subcultural insight. Just as avid fans divide the social world between a small corps of foresightful SF readers and a stolid mass of "mundanes" trapped in consensus "reality," so the Beats and hippies perceived a "split between enlightened hipsters and blinkered 'squares.'" My chapter reads how this division is figured in two bodies of work—the SF-inflected stories and poems of the 1950s Beat writers and the early-1960s craze for "beatnik SF" stories—as well as the legacy it has left for later forms of countercultural expression, whether within the genre (for example, Samuel R. Delany's 1966 novel *Babel-17* futuristically allegorizing the hip-square dichotomy) or outside it (for example, hippie religions drawing inspiration from SF works like Robert A. Heinlein's *Stranger in a Strange Land* [1961]).

The next two chapters delve into (sub)cultural identities and practices that feature complex dialectics of embodiment and science-fictionality. Patricia Melzer's chapter on sexuality examines the way traditional SF stories, rife with heteronormative assumptions and attitudes, were transformed by the advent of gay liberation, leading both to the growing inclusion on nonstraight characters in SF texts and to the establishment of institutions, such as the fan-based Gaylactic Network, that work within the genre to promote awareness about LGBT issues. Yet Melzer also shows the many ways in which traditional SF, though on the surface seemingly chaste, was actually permeated with sexual themes and topics, from Gernsback's postpulp career as a popularizer of sexology to Heinlein's occasional depictions of futuristic polyamory. Melzer traces in detail the ways that science fiction has borrowed ideas from "scientific" theories of gender and sexuality, while at the same time, in its projections of radical alterity, "destabiliz[ing] the naturalization of knowledge about bodies and desires produced by the natural sciences as well as by sexology and psychoanalysis." Ross Farnell's chapter explores the recent mainstreaming of body-modification practices, once the province of subcultures such as modern primitivism and S/M fetishism, via reconceptualizations of the body that have deep roots in SF—especially "the transgressive aesthetics and ideologies of cyberpunk and the cyborg, which have moved from the page to the catwalk and piercing parlor." The availability of the body for radical self-fashioning, a malleable surface for futuristic inscription and even surgical alteration, has been a theme of SF since at least Wells's The Island of Dr. Moreau (1897), but it reached a peak of intensity in the work of cyberpunk authors during the 1980s. For example, Bruce Sterling's popular "Shaper-Mechanist" series extrapolates divergent posthuman futures, one involving the genetic reconfiguration of the body and the other its prosthetic augmentation, the latter in particular having significant overlap with contemporary practices of neotribalist self-surgery. What cyberpunk SF and body-modification subcultures also share, in Farnell's view, is an uneasy yet complicit relationship with a commodified mainstream technoculture that has been progressively pushed into the most intimate reaches of the embodied self.

Thomas Foster scrutinizes the other half of cyberpunk's mind-body dualism in his chapter on cyberculture. On the one hand, he shows how cyberpunk's fantasies of disembodiment and prosthetic agency are rooted in the perspectives of the postwar cybernetics movement, especially its vision of living organisms as informational machines with indefinite borders; on the other hand, he shows how cyberpunk's extrapolations of cybernetic ideas have been folded back into contemporary cyberculture, leading to innovations in computer interface design. The final chapter in Part III looks at an off-shoot of cyberpunk, steampunk, and its relationship to the larger cultural phenomenon of retrofuturism, both of which reflect "current dissatisfaction with the present while creating a nostalgia for what we once considered the future." As Elizabeth Guffey and Kate C. Lemay demonstrate, the optimism of midcentury technoculture, as expressed not only in the SF produced during the period but also in mainstream cultural phenomena such as the space age design canvassed in Woodham's chapter, has become an object of both fascination and skeptical reconsideration within retrofuturist subcultures. The most emblematic of these is steampunk, which began as an SF subgenre and has morphed into a lifestyle movement that bypasses twentieth-century technoculture in favor of earlier forms of technology more amenable to a culture of "tinkering." Yet for all their quirky earnestness, "most retrofuturism and steampunk forms contain an ironic note, lending the entire genre a kind of subversive power."

Guffey and Lemay's chapter straddles the divide between Parts III and IV, focusing on both an SF subculture (steampunk) and its animating perspective on the world (retrofuturism). Of course, the division between culture and worldview (like that between medium and culture, which separates the chapters in Parts II and III) is essentially artificial, since cultures are shot through with ideologies and ideologies manifest themselves as cultural forms. Part IV, entitled "Science Fiction as Worldview," offers critical assessments of the science-fictional qualities of 11 ideological systems, as well as analyses of the impact of these systems on the development of SF itself. Just as Part III endeavors to provide a sense of just how thoroughly twentieth-century cultural formations have been science-fictionalized, so the overall goal of Part IV is to convey an appreciation for the deep penetration of SF ideas and values into some of the major forms of thought characteristic of the modern period, broadly construed. The first two chapters, by Adam Roberts and William Hughes, address the Enlightenment and the Gothic, respectively-two seemingly opposed worldviews that nonetheless drew upon proto-SF discourses and had a significant influence upon the subsequent evolution of the genre. Obviously, the Enlightenment's notion of the emancipatory power of reason and scientific knowledge has deeply informed modern SF, but, as Roberts shows, Enlightenment thinkers often had recourse to SF themes of cosmic voyaging and vertiginous shiftings of scale, as in Voltaire's "Micromégas" (1752), a satirical story of first contact between benighted Earthmen and the eponymous alien philosopher, a gigantic being of unfathomably enlightened understanding. For his part, Hughes shows how the worldview of Gothic fiction, though considerably darker in tone than that produced by Enlightenment philosophes, was still complexly entangled with the emergent SF genre. Indeed, according to Hughes, the Gothic and SF share a close textual and ideological kinship: each genre functions as "a literary laboratory, a projected experimental space that, if it does not satisfactorily claim a didactic imperative, almost invariably interrogates the limits of the human as much as those of the imaginary technological." Starting with Mary Shelley's Frankenstein (1818), the Gothic becomes as obsessed as does SF with scientific figures and practices, a concern evident in works of Victorian Gothic such as Bram Stoker's *Dracula* (1897), thus paving the way for modern SF-Gothic hybrids such as Richard Matheson's *I Am Legend* (1954).

The next three chapters also consider the subsequent careers of nineteenth-century worldviews, perspectives ready-made for SF appropriation due to the inherently science-fictional aspect of some of their core ideas. Patrick B. Sharp's discussion of Darwinism not only traces its clear influence on the development of science fiction, especially in the genre's treatment of race, gender, and technology, but also discusses the science-fictionality of Darwinism itself, from the voyage of scientific discovery aboard the Beagle that helped lead to its birth to the various pseudoscientific mutations, such as eugenics, that it spawned. What Darwinism bequeathed to SF, above all, was a set of "colonial assumptions," deeply embedded in the fabric of Victorian science, that have since become "an inseparable part of the plots, characterizations, and framing logics of the SF genre as a whole." John Rieder's chapter develops this connection further, building on his 2008 study Colonialism and the Emergence of Science Fiction, which demonstrated the imbrication of early SF with colonialist ideologies. Here, Reider turns his attention to postcolonial theory, showing how its themes of cultural hybridization and zones of contact at once manifest an implicitly science-fictional dynamic and readily lend themselves to extrapolation in SF narratives. His chapter draws a distinction between the forms of postcolonial thought and expression-including works of SFthat engage with the histories of settler colonialism, where one culture displaces and virtually exterminates another, and dependent colonialism, where two cultures coexist in a hierarchy of domination and subordination. Anthony Enns, in his chapter on pseudoscience, analyzes three Victorian fringe theories—of the hollow earth, Martian canals, and extrasensory perception-that were themselves deeply science-fictional and that, perhaps not surprisingly, "migrated to science fiction after they were rejected by orthodox science." Moreover, the modern genre itself has been a prolific incubator of pseudoscientific belief systems; indeed, as Enns shows, John W. Campbell, during the last two decades of his career as editor of Astounding Science-Fiction (later Analog), ostensibly the most hard-scientific of the SF magazines, became an avid promoter of ideas that "official science ... dismisses with annoyance."

While not exactly a pseudoscience, Futurism or futurology, which is the subject of Andrew M. Butler's chapter, is not precisely a social science either. Butler surveys the explosion of professional Futurism during the 1960s, with new think tanks such as the World Future Society and the Institute for the Future generating quasi-science-fictional forecasts of coming trends. A highly technocratic discourse, Futurism nonetheless, according to Butler, has links back to Christian eschatology, as well as obvious affinities with science fiction. The genre is indeed sometimes seen as a variant of Futurism, seeking to predict the effects of social and technological change (for example, the "Future History" plotted out by Heinlein in the 1940s). Eminent popular Futurists such as Alvin Toffler recommended SF as "a kind of sociology of the future" that "has immense value as a mind stretching force for the creation of the habit of anticipation" (qtd. Butler), and historical cross-over between the two discourses has been significant (for example, Arthur C. Clarke was both a major SF writer *and* a Futurist). Yet to conflate the two is to ignore the specifically *aesthetic* character of SF's extrapolations, Butler argues, and the necessary estrangement attendant on any science-fictional depiction of futurity. Colin Milburn's chapter on posthumanism focuses on a particular manifestation of Futurist thinking: the anticipation of an imminent transcendence of the fetters of embodied existence thanks to massive biotechnological or cybercultural advances. This vision links fringe sciences like cryonics with science fiction; indeed, as Milburn shows, the idea of immortality via cryogenic suspension was actually pioneered by a minor SF writer of the 1940s, Robert Ettinger. Milburn analyzes the rhetorical and discursive conflation of posthumanism and SF, with each plundering ideas and vocabulary from the other; echoing Hollinger, he suggests that "science fiction" today designates less a cohesive genre than a distributed "mode of discourse" that can be found equally "in literary texts, pop-science books, or futurological documentaries."

The following two chapters cover sociopolitical philosophies with strong currents of connection with SF. Lisa Yaszek's chapter argues that "SF is naturally compatible with the project of feminism": both are at their cores utopian discourses that outline speculative scenarios for the radical reconfiguration of social roles and relationships. Yaszek tracks the historical exchanges between these discourses over the "three waves" of feminist thought and activism since the nineteenth century, showing how feminist writers consistently turned to the resources of SF and the utopian novel to drive home their ideas, from Charlotte Perkins Gilman's depiction of a female-only community in Herland (1915) to Shulamith Firestone's imagination of a postbiological destiny for women in The Dialectics of Sex (1970) to Donna Haraway's embrace of the cyborg as a progressive gender mythology in her "Cyborg Manifesto" (1985). At the same time, SF authors as diverse as Melissa Scott, Octavia E. Butler, and Geoff Ryman have been inspired by feminist insights, while Joanna Russ wrote major works of both SF and feminist criticism. Neil Easterbrook, in his chapter on libertarianism and anarchism, explores a similar collusion between modes of sociopolitical thought and science fiction. Just as libertarian thinkers such as Ayn Rand have penned quasi-SF novels to espouse their ideas, so SF writers such as Heinlein and L. Neil Smith have crafted futures extrapolating ideals of unconstrained commerce and individual liberty. Since 1979 the Libertarian Futurist Society has given a Prometheus Award for SF novels that best reflect a libertarian worldview; as might be expected, the winners have been largely right-wing works, yet a handful of left-wing anarchist novels-especially those of Ken MacLeod-have also won. Easterbrook carefully distinguishes between these social philosophies, while showing their mutual imbrication in a worldview suspicious of centralized authority, an attitude that has long informed SF itself; indeed, to the extent that SF depicts "alternate future[s] or ask[s] readers to reflect on alternate presents, it is," says Easterbrook, "oppositional by definition."

While Yaszek and Easterbrook trace dialectics linking sociopolitical worldviews and SF, De Witt Douglas Kilgore analyzes Afrofuturism as an overarching mode of thought and creative expression that *includes* science fiction alongside other technocultural forms, such as hip-hop and experimental jazz, that make "self-conscious

use of a speculative-fictional style" in order to muse on the collective fate of the descendants of the African diaspora. Citing anthologies on black and postcolonial SF edited by Sheree R. Thomas and Nalo Hopkinson, as well as a range of SF novels, Kilgore shows the long history of Afro-diasporic engagement with the genre. In Kilgore's view, Afrofuturism deploys utopian perspectives to critique dystopian realities, locating alternative trajectories that frame the future as "complex and contradictory rather than destructive." With the recent advent of Chicano/a and indigenous Futurisms, it is clear, says Kilgore, that Afrofurism has become "a model for how other peoples of color might view the futuristic art they create, allowing them to become conscious of their own imbrication in a technoscientific culture and to resist erasure from the narratives it sponsors." The utopian outlook characteristic of Afrofuturism and many of the other worldviews canvassed in this part makes it only appropriate that the volume should end with a chapter on utopianism itself. Phillip E. Wegner sees utopianism not as a mode of thought that intermingles with SF but rather as essential to the genre's very existence; indeed, "It is precisely its utopianism that distinguishes modern science fiction both from precursor forms ... and from the contemporary practices of futurology and prognostication." Given that I have taken issue in this Introduction with the Suvinian model of literary genre studies, it is also appropriate that this book should conclude with a stout defense of Suvin's critical legacy. According to Wegner, Suvin's key ideas of cognitive estrangement and the novum, his quintessential features of SF as a narrative form, both necessarily depend upon a utopian worldview; the basic task of an SF text "is to give figurative form to such a dramatic break from the status quo" that a reader's mindset is scrambled and reordered, opened to the "anticipatory illumination" of an alternative mode of being or form of social organization. Wegner shows this latent utopianism at work in both SF criticism and neo-Marxist theory, as well as in SF novels by Alfred Bester, Arkady and Boris Strugatsky, and Ken MacLeod.

Despite the wide range of topics covered in this Handbook, no one is more aware than I of all that has been omitted. As noted above, the essential problem for SF studies today is to determine what does not count as science fiction, and I could easily have included chapters on SF toys, SF theater, the science-fictional qualities of portable electronic devices, the "social science fiction" movement in anthropology and sociology, the discourse of human-animal studies, and much more. But as I have indicated, my goal in assembling this volume was to be representative rather than exhaustive, to convey a powerful sense of how deeply science-fictional ideas and attitudes have permeated the social fabric during the past two centuries, making SF today less a fixed and coherent genre than a diverse and distributed ensemble of phenomena that resists totalization or even ready summary. In many ways, science fiction has become the master discourse of our technocultural experience, the privileged chronicler of what Csicsery-Ronay has called "the *technologiade*, the epic of the struggle surrounding the transformation of the cosmos into a technological regime" (217). While the cosmos this Handbook maps is a relatively modest one, I hope that it will serve to inspire future projects of critical cartography, within science fiction studies and beyond.

I would like to close with some brief acknowledgments and a dedication. Most obviously, I want to thank the 44 contributors, both for their prompt and gracious responses to my queries and for their tremendous patience as this book has wended its way toward completion. I am grateful to my colleagues in the English Department at the University of California, Riverside (UCR) for their unstinting support of my research on science fiction, and to Stephen Cullenberg, dean of the College of Humanities, Arts, and Social Sciences, whose visionary leadership has made UCR's Science Fiction and Technoculture Studies (SFTS) program a reality, thus giving me a home base from which to mount projects such as this. I would also like to thank my co-editors at *Science Fiction Studies*, several of whom contributed chapters to this book, and especially to the managing editor, Arthur B. Evans, for all his wise mentorship over the years. And I am more grateful than words can express to my indefatigable Research Assistant, Lorenzo Servitje, for the painstaking efforts he took to secure the permissions for the numerous illustrations included in this volume, and to my editor at Oxford, Brendan O'Neill, for his great patience and understanding.

Finally, I would like to dedicate *The Oxford Handbook of Science Fiction* to two cherished colleagues and friends: Brooks Landon, with whom I worked for over a decade at the University of Iowa and without whose groundbreaking criticism, consistently aimed at expanding the perceived borders of our field, this book would never have been possible, and Sherryl Vint, my SFTS collaborator and comrade in arms, whose brilliance and diligence as a scholar have been a continuous inspiration. *Per aspera ad astra*. Rob Latham

WORKS CITED

Alkon, Paul K. Origins of Futuristic Fiction. Athens: Georgia UP, 1987. Print.

- Bailey, J. O. Pilgrims in Space and Time: Trends and Patterns in Scientific and Utopian Fiction. New York: Argus, 1947. Print.
- Bleiler, Everett F. The Checklist of Fantastic Literature: A Bibliography of Fantasy, Weird, and Science Fiction Books Published in the English Language. Chicago: Shasta, 1948. Print.
- Bould, Mark, Andrew M. Butler, Adam Roberts, and Sherryl Vint, eds. *The Routledge Companion to Science Fiction*. New York: Routledge, 2009. Print.
- Bukatman, Scott. Terminal Identity: The Virtual Subject in Postmodern Science Fiction. Durham, NC: Duke UP, 1993. Print.
- Csicsery-Ronay Jr., Istvan. *The Seven Beauties of Science Fiction*. Middletown, CT: Wesleyan UP, 2008. Print.
- "Editorial." Special Issue: Science Fiction and the Non-Print Media. *Science Fiction Studies* 7.3 (Nov. 1980): 245–46. Print.
- Franklin, H. Bruce. War Stars: The Superweapon and the American Imagination. New York: Oxford UP, 1988. Print.
- Freedman, Carl. *Critical Theory and Science Fiction*. Hanover, NH: Wesleyan UP, 2000. Print. ______. "Kubrick's 2001 and the Impossibility of a Science-Fiction Cinema." *Science Fiction Studies* 25.2

(July 1998): 300-18. Print.

- Hayles, N. Katherine. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago: U Chicago P, 1999. Print.
- Hillegas, Mark. "The Course in Science Fiction: A Hope Deferred." *Extrapolation 9* (Dec. 1967): 19-21. Print.
- James, Edward. "Before the *Novum*: The Prehistory of Science Fiction Criticism." *Learning from Other Worlds: Estrangement, Cognition and the Politics of Science Fiction and Utopia.* Ed. Patrick Parrinder. Liverpool: Liverpool UP, 2000. 19–35. Print.
- Jameson, Fredric. *Postmodernism, or, The Cultural Logic of Late Capitalism.* 1991. Durham, NC: Duke UP, 1992. Print.
- Ketterer, David. New Worlds for Old: The Apocalyptic Imagination, Science Fiction, and American Literature. Bloomington: Indiana UP, 1974. Print.
- Landon, Brooks. *The Aesthetics of Ambivalence: Rethinking Science Fiction Film in the Age of Electronic (Re)Production*. Westport, CT: Greenwood, 1992. Print.
- _____. Science Fiction After 1900: From the Steam Man to the Stars. New York: Twayne, 1997. Print.
- Luckhurst, Roger. *Science Fiction: A Cultural History*. London: Polity, 2005. Print.
- Malmgren, Carl. Worlds Apart: Narratology of Science Fiction. Bloomington: Indiana UP, 1991. Print.
- McCaffery, Larry, ed. Storming the Reality Studio: A Casebook of Cyberpunk and Postmodern *Fiction*. 1991. Durham, NC: Duke UP, 1992. Print.
- Parrinder, Patrick. "Revisiting Suvin's Poetics of Science Fiction." Learning from Other Worlds: Estrangement, Cognition and the Politics of Science Fiction and Utopia. Ed. Patrick Parrinder. Liverpool: Liverpool UP, 2000. 36–50. Print.
- Penley, Constance, Elisabeth Lyon, Lynn Spigel, and Janet Bergstrom, eds. *Close Encounters: Film, Feminism, and Science Fiction.* Minnesota: U of Minnesota P, 1991. Print.
- Philmus, Robert. *Into the Unknown: The Evolution of Science Fiction from Francis Godwin to H.G. Wells*. Berkeley: U of California P, 1970. Print.
- . "The Shape of Science Fiction: Through the Historical Looking Glass." *Science Fiction Studies* 1.1 (Spring 1973): 37–41. Print.
- Rieder, John. *Colonialism and the Emergence of Science Fiction*. Middletown, CT: Wesleyan UP, 2008. Print.
- Rose, Mark. *Alien Encounters: Anatomy of Science Fiction*. Cambridge, MA: Harvard UP, 1981. Print.
- Ross, Andrew. Strange Weather: Culture, Science and Technology in the Age of Limits. New York: Verso, 1991. Print.
- Sobchack, Vivian. *The Limits of Infinity: The American Science Fiction Film, 1950–1975.* South Brunswick, NJ: Barnes, 1980. Print.
- Sterling, Bruce. "Preface." *Mirrorshades: The Cyberpunk Anthology*. New York: Ace, 1986. ixxvi. Print.
- Suvin, Darko. *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre.* New Haven, CT: Yale UP, 1979. Print.
- Wolfe, Gary K. *The Known and the Unknown: The Iconography of Science Fiction*. Kent, OH: Kent State UP, 1979. Print.
- Wolmark, Jenny. Aliens and Others: Science Fiction, Feminism, and Postmodernism. Iowa City: U of Iowa P, 1994. Print.

PART I

SCIENCE FICTION AS GENRE

CHAPTER 1

EXTRAPOLATION AND SPECULATION

BROOKS LANDON

IN one of the early sustained critical attempts to introduce readers to the protocols of science fiction, *Inquiry into Science Fiction* (1955), Basil Davenport opened his chapter "Speculative Science Fiction" by referring to a couple of humorous quotations that introduce a number of recurrent issues in the ongoing attempt to explain the nature of SF. The first he attributes to a Frank Stockton character who muses, "If some things were different, other things would be otherwise" (45). The second he attributes to a character in a *Punch* cartoon who sadly observes, "Things might be so different if they wasn't as they is" (45). These comments point toward two of science fiction's most important rhetorical approaches: trying to imagine the future in terms of extrapolating from the present, in effect asking what might be "if this goes on...," and trying to imagine conditions significantly different from those of the writer's reality by posing the question "what if...?"

Davenport's chapter title implicitly suggests that science fiction has to do with "speculation," one of a cluster of terms largely understood as limiting the science-fictional imagination to a necessary concern with science and associating its narrative with forms of extrapolation and questions of plausibility. Accordingly, in many—if not most—of the discourses of science fiction, "extrapolation" and "speculation" are both understood as means to a crucial end: science fiction, in whatever fashion, must somehow go beyond what is currently known and must represent the unknown through some rhetoric of "plausibility." Plausibility, in turn, has largely been discussed in the discourse of SF in terms of the centrality of science, whether understood narrowly and monolithically or broadly and metaphorically.

As is true of so many ostensible binary oppositions in the discourse of science fiction, this one has been complicated by years of polemical and prescriptive constructions and definitions that have so blurred distinctions between the two terms as to make them impossible of definitional clarity or even of historical recovery. Speculation has been variously discussed in contrast with extrapolation, as an extension or further stage of extrapolation, as a category of which extrapolation is a subset, and so on. And these two terms are particularly problematic, since as frequently as they are cast in opposition to each other, they are used as if they are interchangeable. For example, an overview of the genre by Lisa Yaszek suggests in its first sentence that science fiction is seen by literary and cultural historians "as the premiere narrative form of modernity because authors working in this genre extrapolate from Enlightenment ideals and industrial practices to imagine how educated people using machines and other technologies might change the material world," and then adds in her second sentence: "This kind of future-oriented technoscientific speculation lends itself to social and political speculation as well" (385). As we can see, Yaszek uses the terms interchangeably, and her comment suggests how comparison of these two nouns can be further complicated by the wide use of verb and modifier forms of each in which "speculate" or "speculative," "extrapolate" or "extrapolative" may be deployed without any necessary reference to the more bounded concepts of "speculation" and "extrapolation."

A contemporary interrogation of extrapolation and speculation as tools of scientific thinking must be understood more diachronically, as emerging from specific historical conditions and taking shape and changing over time, than as synchronic or capable of fixed, unchanging definition. It may be best to think of three different constructed relationships between the two terms. Historically, there is a line of SF thinking that opposes extrapolation to speculation, with the former term suggesting the fidelity to known and possibly even existing science and technology associated with the narratives of Jules Verne and the latter suggesting the more sociologically focused and less obviously plausible narratives of H. G. Wells. Another relationship can be seen in such works as Hal Clement's Mission of Gravity (1954), where speculation forms an initial set of "rules" as the starting point for a narrative not extrapolated from known facts, but that is then developed as rigorously as possible by extrapolating consequences from these starting "rules." And still another, particularly found in the contemporary discourses based on the idea of the Singularity, starts from extrapolation, but then claims that developments reach a point beyond which not only extrapolation but also speculation is no longer possible. So, one relationship posits extrapolation and speculation as near binary opposites, roughly alignable with other binaries such as that between "hard" and "soft" SF, while the other two position them as sequential stages, one starting from speculation and then becoming the baseline for extrapolation, the other starting from extrapolation and leading to speculation.

Both extrapolation and speculation have been understood at various times and by various writers as beginning not from a baseline scientific or sociological "reality," but from the textual base of a preceding SF story. In this way, James Patrick Kelley's "Think Like a Dinosaur" (1995) can be seen as a critical extrapolation from Tom Godwin's "The Cold Equations" (1954), Karen Joy Fowlers "What I Didn't See" (2003) can be thought of as an extrapolation from James Tiptree's "The Women Men Don't See" (1973), and countless artificial life stories can all be seen as extrapolations from Mary Shelley's *Frankenstein* (1818).

To complicate matters further still, extrapolation and speculation are popularly associated with quite different semantic registers, with extrapolation being a widely used mathematical term that denotes precision and extension from the known to the unknown, while speculation is a widely used financial term, with connotations of risk, lack of firm evidence, and uncertainty. Despite widespread invocation of both terms in discussions of SF, systematic treatments are very hard to find. *The Encyclopedia of Science Fiction* (1993) not only does not have an entry on "speculation," but declines a direct definition of "extrapolation," referring readers instead to "prediction" (397), whose corresponding entry immediately rules out prediction as an essential goal of SF. Similarly, neither extrapolation nor speculation is indexed in Roger Luckhurst's *Science Fiction* (2005), Istvan Csicsery-Ronay's *The Seven Beauties of Science Fiction* (2008), or Mark Bould and Sherryl Vint's *The Routledge Concise History of Science Fiction* (2011). Indeed, almost all discussions of extrapolation and/or speculation fail to specify the characteristics of either term, much less establish any rigorous sense of their relationship to each other.

One noteworthy exception, however, was Robert A. Heinlein's "Pandora's Box," first published under the title "Where To?" in 1952, that set the terms for most subsequent discussions of extrapolation and speculation. Heinlein tends to use these terms normatively and somewhat interchangeably: speculation is clearly the more expansive idea, but it is grounded in adherence to the "scientific method," and *both* terms function only in terms of plausibility. For Heinlein, scientific possibility is necessary for both extrapolation and speculation, and most SF writers make use of both methods. His explanation, which has been highly influential, if not originary, has a certain axiomatic ring to it:

"Extrapolation" means much the same in fiction writing as it does in mathematics: exploring a trend. It means continuing a curve, a path, a trend into the future, by extending its present direction and continuing the *shape* it has displayed in its past performance—i.e., if it is a sine curve in the past, you extrapolate it as a sine curve in the future, not as an hyperbola, nor a Witch of Agnesi, and *most certainly not* as a tangent straight line.

"Speculation" has far more elbowroom than extrapolation; it starts with a "What if?"—and the new factor thrown in by the what-if may be both wildly improbable and so revolutionary in effect as to throw a sine-curve trend (or a yeast-growth trend, or any trend) into something unrecognizably different. What if little green men land on the White House lawn and invite us to join a Galactic union?—or big green men land and enslave us and eat us? What if we solve the problem of immortality? (238–39; emphasis in original)

In another of his well-known ruminations on SF, "Science Fiction: Its Nature, Faults and Virtues" (1959), Heinlein expands the notion of "awareness" of scientific method, charging the SF writer with speculating from "such facts as there are" concerning seemingly impossible phenomena such as time travel and ghosts and doing so "as grandly and sweepingly as his imagination permits" (8). "Every new speculation necessarily starts by kicking aside some older theory," he notes, adding that phenomena that may seem "impossible, contrary to scientific fact," are actually only "contrary to present orthodox theory," and therefore fair game for science-fictional exploration (7).

Heinlein offers the most sustained rationale for the kind of science fiction strongly associated with John W. Campbell's influential editorship of SF's flagship magazine, Astounding Science-Fiction (renamed Analog in 1960) from 1937 to 1971. Possibly the most extended revelation of what "science" meant to Campbell may be found in his "The Place of Science Fiction" (1953), where he personifies it as a cold, inhuman, unemotional, rigid monolith. If Heinlein serves as Campbell's chief spokesperson for the importance of SF's fidelity to science through extrapolation, another celebrated writer closely associated with Campbell was Isaac Asimov, who also hewed to the Campbell view of science and scientific method, but who famously expanded the purview of science in his essay "Social Science Fiction" (1953). Asimov's discussion provides several new valuable perspectives for the comparison of extrapolation and speculation. Asimov divides SF into three forms of narrative: adventure stories, gadget stories, and social science fiction, illustrating each category with brief glosses on how a writer in 1880 might construct a story about "an imaginary vehicle that can move without horses by some internal source of power" (40). Asimov suggests that adventure SF and gadget SF both depend on the extrapolation of a "horseless carriage" from what is known of other mechanized transport combined with rudimentary knowledge of the workings of an internal combustion engine. The social science fiction narrative, however, might start from the assumption that something called a horseless carriage or an automobile had somehow been perfected and this technology had led to unforeseen problems connected with the oil industry, roadway infrastructure, and accidents. As Asimov drily notes: "It is easy to predict an automobile in 1880; it is very hard to predict a traffic problem. The former is really only an extrapolation of the railroad. The latter is something completely novel and unexpected" (41). Asimov shifts focus from extrapolation to speculation, but also specifies a necessary limit to the science-fictional presentation of "the completely novel and unexpected" by noting that there "is a great difference between taking liberties with the unlikely and taking liberties with the impossible" (42).

In a 1977 essay, "The Science in Science Fiction," another former Campbell writer, and later an editor of *Analog* himself, Stanley Schmidt, offered a sustained consideration of the relationship between extrapolation and speculation and the roles both play in establishing the plausibility of science as imagined in SF. Schmidt replaces "speculation" as a category with what he calls "innovation." Extrapolation, according to Schmidt, means "speculation based on extensions, developments, and applications of well-established knowledge." He adds: "No new principles are postulated, so it can be said with a fair degree of assurance that these speculations are things that we know are possible" (30). He distinguishes "innovation" from "extrapolation," stipulating that the former "does depend on the assumption of new—i.e., now unknown—principles" (31), offering faster-than-light travel, anti-gravity, and time travel as examples. For this kind of innovation to count as science-fictional, it "cannot be proved possible," but it is also important that "nobody should be able to prove it's *impossible* at the time of its writing" (31; emphasis in original). Edging back somewhat from insistence on strict standards of possibility or impossibility, Schmidt cites the need in an SF story for "internal consistency" and calls for the SF writer to "make at least a passing attempt at explaining any new principles" (33). Even such "a passing attempt" to establish plausibility may be successful because SF readers have read a lot of stories in which plausible explanations for implausible phenomena have been offered. As a result of reader familiarity with the larger SF megatext, "There are some things which once were innovative, have not even remotely become part of accepted scientific knowledge, and yet are now readily accepted by readers without explanation" (33).

A more expansive view of this phenomenon has been advanced by Stanislaw Lem, who explains that science fiction's ties to the real world are quite elastic as "the real world-the world which realism describes in its contemporary shape" is something SF "tries to describe at other points on the space-time continuum" (35). In effect, this shifts the issue from asking whether a fictional semblance is plausible to the question of whether it could be plausible, a question the answer to which, as Schmidt suggests, may be found in the reader's knowledge of the SF megatext. If the reader is familiar with other SF works that offer at least a gesture toward a plausible explanation for their departures from everyday reality, that might suffice. As a result, it may be the case that the evaluation of the plausibility of both extrapolation and speculation depends as much on the reader's familiarity with the SF megatext as on any cognitive connection to science or technology. Accordingly, SF's claim to plausibility frequently rests on a consensual hoax. It is the specific premise of SF, Lem specifies, "that anything shown shall in principle be interpretable empirically and rationally" (35). And that "in principle" is key, since, as Lem reminds us, much narrative machinery in "realistic" fiction is already patently fantastic, as when the thoughts of dying man are enlisted in telling a story.

Joining Heinlein and Schmidt as one of the very few writers or critics who offer their views of both extrapolation and speculation, and joining Lem in his acceptance of the essential rhetorical hoax of SF, Basil Davenport freely acknowledges that SF writers frequently resort to rhetorical "jiggery pokery" (1) or "scientific double-talk" (2) or "scientific hocus pocus" (14) to ground their narratives in the plausible. This is not difficult, he notes, because "readers will apparently accept anything if they are told it is scientific" (14). Having identified the idea of a "space-warp" as the kind of jiggery pokery necessary to make some SF narratives possible, Davenport explains extrapolation in a way that makes it sound more like what Heinlein calls speculation, associating it both with the jiggery pokery of space-warps and parallel universes and locating its starting point in the social rather than the exact sciences: "We take some tendency in our present society, toward sexual license, say, or the prolonging of the life span, or the dominance of women, imagine it enormously increased, and show the probable consequences" (12).

If Davenport shifts our understanding of extrapolation and speculation further from the science-fetishizing pole represented by Campbell, Heinlein, and Asimov, Judith Merril is the SF writer and editor who most clearly wants to leave that pole far behind. The "speculative fiction" Merril is known for championing has some features in common with the "speculative fiction" promoted by Heinlein, but it resists the assumption that "science" is the prime arbiter of plausibility and argues that speculation has more in common with "mainstream" literature than with Campbell-style genre SF. Merrill developed her views of the nature and role of speculative fiction in the yearly summations featured in her series of twelve "Year's Best S-F" anthologies (edited from 1956 through 1969), as well as in the long 1966 essay, "What Do You Mean: Science? Fiction?" As those two provocative question marks in her title suggest, Merril's essay sets out to challenge "certain axiomatic assumptions" about both terms (53). According to Merril, speculative fiction consists of "stories whose objective is to explore, to discover, to *learn*, by means of projection, extrapolation, analogue, hypothesis-and-paper-experimentation, something about the nature of the universe, of man, of "reality" (60; emphasis in original). As she elaborates:

I use the term "speculative fiction" here specifically to describe the mode which makes use of the traditional "scientific method" (observation, hypothesis, experimentation) to examine some postulated approximation of reality, by introducing a given set of changes—imaginary or inventive—into the common background of "known facts," creating an environment in which the responses and perceptions of the characters will reveal something about the inventions, the characters, or both. (60)

Merril's overview of the evolution of science fiction into speculative fiction centers on the roles of influential editors in promoting an ever-more-capacious aesthetic, starting with Hugo Gernsback in the 1920s and moving to Campbell in the 1940s, Anthony Boucher and Horace L. Gold in the 1950s, and Michael Moorcock in the 1960s. She sees Gernsback's limited view of science leading to stories containing "endless expositions of technical, technological, technophiliac and Technocratic ideas" (63) and Campbell's "engineering" view offering a still limited but "broader concept of the scope of 'science'" (68). Campbell, she suggests, actually "created an audience for new speculative idea fiction, which his own magazine was no longer supplying" (77). Enter Boucher and Gold, editors of *The Magazine of Fantasy and Science Fiction* and *Galaxy*, respectively, both encouraging fresh ideas not so closely tied to a limited construction of science.

Proclaiming Reginald Bretnor's "The Future of Science Fiction" (1953) "the outstanding critical insight into the nature and direction" of SF, Merril credits Bretnor with matching Boucher's call for a new literature "whose special province is science," but that would represent a true synthesis between science and literature (83). Indeed, Bretnor seems to offer the blueprint for Merril's "speculative fiction," including an implicit distinction between extrapolation and speculation that starts from the assumption that areas of inquiry exist for which we not only "have no scientific maps" but "as yet no mapping instruments" (Bretnor 286). These uncharted areas, Bretnor insists, "are a proper study for the scientist and for the science fiction writer, both of whom have as their function, not outright affirmation, not flat denial, but the exploring of every possibility—and of a great many apparent impossibilities as well" (287).

In the synthesis of two kinds of extrapolation, that which extrapolates from known "maps" of science and that which extrapolates from areas for which no "new maps" have

been drawn, Bretnor sees the "seed of an entire new literature" (288), an "integrated literature" equally driven by scientifically informed mainstream writers and artistically informed SF writers. Clear signs of Bretnor's messianic aesthetic can be found everywhere in Merril's writings about SF, especially her advocacy for the 1960s British "New Wave" as just such a newly relevant speculative literature, with Moorcock, editor of the New Wave flagship *New Worlds*, the driving force. Commensurate with this succession of editors, Merril proposes a succession of writers offering ever-broader instances of speculation, with Cordwainer Smith's "Scanners Live in Vain" (1950) the first example of the kind of "integrative" SF called for by Bretnor and envisioned in her normative use of "speculative fiction." And J. G. Ballard becomes for Merril the writer who best exemplifies the "new literature" she sees emerging (94).

Merril is well known for her own editing of Year's Best S-F. The very titles of these anthologies reflect her impatience with "science fiction" as a term, as she cycles through various permutations of *s* and *f*, the hyphen between coming and going. As she eventually explains in her sixth volume, her insistence on initials was intended to signal that her concern was not just with genre science fiction, but with "the whole field of science-fantasy, of speculative literature" ("Summation" 375). In 1967 Merril edited SF: The Best of the Best, collecting her favorite stories from the first five annuals, reminding her readers that science fiction "is not fiction about science, but fiction which endeavors to find the meaning in science and the scientific-technological society we are constructing" ("Introduction" 3). What she wants speculative fiction to be is "a special sort of contemporary writing which makes use of fantastic or inventive elements to comment on, or speculate about, society, humanity, life, the cosmos, reality. And any other topic under the general heading of philosophy" (3). In her comments for the last volume in the series, SF 12, published in 1969, Merril announces that she has finally settled on what she wants SF to stand for, embracing Robert Scholes's concept of "fabulation," which she sees as an answer to Bretnor's call for an "integrated literature." "Speculative Fabulation" is what she opts for, hopefully announcing: "SF: Speculative Fabulation. A satisfactory solution at last for my abbreviation-in-search-of an-extension?" ("Fish" 11). Whatever Merrill means by SF, it is clearly not tied to the rigorous "plotting the curve" understanding of extrapolation so dear to Campbell, Heinlein, Asimov, et al. Serious fiction that reflects a disciplined mind and that emphasizes "humanics" over mechanics seems to meet Merril's standards for extrapolation from known science. Indeed, her view of speculative literature is similar in many respects to more recent discussions of slipstream.

As this brief overview of some of the most prominent originary discussions of extrapolation and speculation suggests, no two writers seem to use the terms in the same way, and thus rigorous consideration of these terms is quite difficult. Either explicitly or implicitly, all questions about extrapolation and speculation have somewhere in their background concerns with plausibility—its nature, its standards, and its degree of importance. Plausibility in science fiction may be created by a number of different strategies and may refer to a wide range of realities, but is characteristically

linked, however loosely, to some aspect of science or technology. Plausibility in SF nods toward the real and the known, while the "sense of wonder" frequently invoked to explain the affective appeal of SF nods toward the fabulous, if not the fantastic; extrapolation and speculation are the imaginative processes that negotiate the difference between those two ends. Accordingly, important to any understanding of extrapolation and/or speculation are assumptions having to do with the role of "science" in science fiction.

Science is unmistakably and irrevocably associated with SF, whether through its presence or absence. "Imaginary Science" is only one of the seven cognitive "beauties" of science fiction studied by Csicsery-Ronay, but it is arguably the most widely referenced of the beauties. Csicsery-Ronay's chapter starts from the proposition that "science is sf's pretext," leading to "the illusion that SF stories are dramatizations of scientific knowledge," never more than "an image of science, a poetic illusion disguising its illusionary status" (111). His noteworthy point is that extrapolation is essentially *a ludic process*. As particularly opposed to Campbell's view that science is deadly serious stuff, Csicsery-Ronay holds that "exaggeratedly rationalistic theories ignore SF's fundamentally playful performance of scientific thinking":

Even when it is written by professional scientists with established reputations, SF requires its science to violate scientific correctness, even plausibility. Writers take known, plausible, or just widely entertained scientific ideas and extend them speculatively into the unknown, exceeding their contexts, revealing their fantastic dimensions, and undermining obliquely their claims to universal applicability. Most SF writers, far from pushing an agenda of scrupulous respect for scientific truth, toy with it, making it a source of metaphors, rationalized by realistic representation, and embedded in quasi-mythic narrative traditions that express social concerns. (112)

Just as surely as the understanding of extrapolation and speculation has shifted over time, so the understanding of the science in science fiction, whether imaginary or "real," has also shifted and must be approached diachronically. It is ironic that so much discussion acknowledging that SF is first and foremost "the literature of change" has insisted on fixed, synchronic approaches to define or characterize the genre. If science fiction is, as most writers, critics, and readers seem to agree, the literature of change, it follows that, whatever meaning we ascribe to terms such as extrapolation and speculation, their meaning must have inexorably changed over the hundred or so years they have been used in the discourse of SF, and it is equally certain that the relationship between the two terms has changed over that period, with "speculation" gradually supplanting "extrapolation" as the favored term. Moreover, the understanding of known science as the baseline for both terms has also changed. In this sense, the pertinent question may not so much concern the plausibility of the endpoint of extrapolation or speculation as the starting point: what is meant by science. In his excellent "Science Fiction and the Scientific World-View" (1979), Patrick Parrinder has explored this problem, explaining that "science" in SF is frequently used as a sliding signifier variously

understood as "the scientific world-view," "the scientific outlook," "scientific thought," or "an ideology justifying scientific research as intrinsic to the nature and purpose of human existence" (67). Locating all these constructions somewhere between the two conceptual poles of the Darwinian theory of evolution and the certainty of entropy posited by the Second Law of Thermodynamics, Parrinder charts developments in the scientific worldview, periodizing its ascendencies and declines, and contextualizing its concerns in terms of individual actants and cultural and ideological forces. Parrinder reminds us that disillusion and distrust of science have been as prevalent in SF as has its championing and persuasively demonstrate why generalizations about the nature of SF's relations to the scientific worldview can only be understood in terms of change.

Parrinder's approach anticipates both Roger Luckhurst's effort to understand SF texts "as part of a constantly shifting network that ties together science, technology, social history and cultural expression with different emphases at different times" (6) and John Rieder's argument for a historical genre theory, in which our understanding of SF would take into account "the motives, the contexts, and the effects" of those characterizing the genre, "and the many ways of intervening in the genre's production, distribution, and reception" (204). Against the well-entrenched tradition of SF critical discourse that constructs extrapolation and speculation as static terms closely tied to scientific plausibility is the contemporary view that these terms and indeed SF itself should not be thought of as fixed categories or classifications, but as subject to negotiations at particular times and framed by particular circumstances and purposes. Such an elastic approach to the genre is outlined by Mark Bould and Sherryl Vint in their Routledge Concise History of Science Fiction and illustrated more fully in their 2009 polemical essay "There Is No Such Thing as Science Fiction." Bould and Vint argue directly in that essay (and only slightly more obliquely in their Routledge book) that "genres are never, as frequently perceived, objects which already exist in the world and which are subsequently studied by genre critics, but fluid and tenuous constructions made by the interaction of various claims and practices by writers, producers, distributors, marketers, readers, fans, critics and other discursive agents" (48). Their approach to genre also accounts for many discussions of extrapolation and speculation, since particular SF texts are routinely "enrolled," however breezily, as shining examples of extrapolation or of speculation.

Today, even critics who would disagree with Bould and Vint are finding it ever more difficult to sustain static classificatory efforts—due in great part to the changing nature of science. James Gunn, whose SF writing and criticism have been prominent and influential for over sixty years, resignedly acknowledged this in 2006:

Increasingly, from the quanta to the cosmos, uncertainty has become the one constant. At the subatomic level, the only reality is illusory, at the cosmic level, the latest theory imagines the natural world as the three-dimensional aspect of cosmic strings that exist in a ten-dimensional reality. Fantasists seem authorized to let their imaginations soar, and more scientifically minded authors can resort to the magic of nanotechnology. (231) Gunn is not alone in noting the obvious blurring of the line between fantasy and reality in science as well as in SF. Old-school linear extrapolation, usually confined to the near future, has become problematic even in hard SF, as Kathryn Cramer details, noting that "facts" age badly in science, making contemporary science "a moving target" (189). Moving away from the mathematical model of extrapolation, Cramer suggests the need for hard SF to construct science *as a mythology*: "What science gives to hard SF is a body of metaphor that provides the illusion of both realism and rationalism" (188). And yet the ideal of extrapolation based on confidence in the reality of baseline science remains strong in some SF writers, as can be seen in a comment Cramer offers from Greg Egan, one of the preeminent current writers of hard SF. Responding to the situation lamented by Gunn, Egan addresses this phenomenon as a gain rather than as a loss, claiming

what happens in my novels is that the border between science and metaphysics shifts: issues that originally seemed completely metaphysical, completely beyond the realms of scientific enquiry, actually become part of physics. I'm writing about extending science into territory that was once believed to be metaphysical, not about abandoning or "transcending" science at all. (qtd. Cramer 195)

Paolo Bacigalupi, author of the award-winning *The Windup Girl* (2009), joins Egan in insisting on the importance of "extending" science but from a greatly expanded understanding of what can be extended. Bacigalupi believes that science fiction is supposed to display an "extrapolative quality," but his notion of extrapolation is expansive, and seems to value *affective* extrapolation along with technoscientific (including the extrapolation of current fears), while suggesting that just because a writer can "work out the physics" of a fantastic idea doesn't mean the idea isn't "silly stuff." For him, contemporary relevance seems to trump rigor, as he dismisses "lines of speculation which are pretty interesting but not necessarily connected to today's questions" (54).

Like so many before him, Bacigalupi seems to use extrapolation and speculation nearly interchangably, allowing for a broad understanding of extrapolation, but distinguishing it from speculation of the "thought experiment" or merely interesting kind. Comments such as Egan's and Bacigalupi's suggest that while there may never be agreement on the nature of the relationship between extrapolation and speculation, the history of SF suggests an inexorable merging of the two terms, with speculation becoming the more widely used, even by adherents to the hard-science end of the SF continuum. "Genre-morphing" is what John Clute terms this phenomenon (77), while Gary Wolfe writes about Evaporating Genres (2011), both eminent critics noting the passing of an era in which standards of plausibility could be relied upon to demarcate genre boundaries, with obvious implications for older understandings of extrapolation/speculation in terms of plausibility. While SF nominally based on extrapolation and/or speculation with plausible ties to the technoscientific worldview has flourished as a literature of interrogation and contemplation rather than as a literature of prediction, its strained allegiance to plausibility has been in place long enough for SF's claim on extrapolative rigor to have worn thin. Clute suggests that extrapolation, even when not evaluated in terms of predictions, now has a record of failure, as "there is a decreasing resemblance between the world we inhabit today and the future worlds advocated with some consistency of voice and vision, in the American SF of the previous half-century" (66). His point is that "the old story of sf" turns out *not* to have been a story of scientific extrapolation or speculation, but of something else entirely—of "the American Dream of progress" (66).

Finally, Singularity discourse may take these two terms to a self-cancelling extreme as fairly conventional mathematical-style extrapolation is being invoked by Vernor Vinge, Ray Kurzweil, Eric Drexler, Damien Broderick, and other Singularitarians to predict a moment beyond which not even the wildest speculation will be possible. The concept of Singularity thus becomes another argument in the growing recognition that historically freighted and fraught terms such as extrapolation and speculation may have reached the end of their usefulness in the discourse of SF.

WORKS CITED

- Asimov, Isaac. "Social Science Fiction." 1953. *Turning Points: Essays on the Art of Science Fiction*. Ed. Damon Knight. New York: Harper & Row, 1977. 29–61. Print.
- Bacigalupi, Paolo. "*Locus* Interview: The Windup Boy." *Locus* 67.2 (Aug. 2011): 6–7, 54–55. Print.
- Bould, Mark, and Sherryl Vint. *The Routledge Concise History of Science Fiction*. New York: Routledge, 2011. Print.
 - _____. "There Is No Such Thing As Science Fiction." *Reading Science Fiction*. Ed. James Gunn, Marleen Barr, and Matthew Candelaria. New York: Palgrave, 2009. 43–51. Print.
- Bretnor, Reginald. "The Future of Science Fiction." *Modern Science Fiction: Its Meaning and Its Future*. Ed. Reginald Bretnor. New York: Coward-McCann, 1953. 265–94. Print.
- Campbell Jr., John W. "The Place of Science Fiction." *Modern Science Fiction: Its Meaning and Its Future*. Ed. Reginald Bretnor. New York: Coward-McCann, 1953. 3–22. Print.
- Clute, John. "Science Fiction from 1980 to the Present." *The Cambridge Companion to Science Fiction*. Ed. Edward James and Farah Mendlesohn. Cambridge, UK: Cambridge UP, 2003. 64–78. Print.
- Clute, John, and Peter Nicholls, eds. *The Encyclopedia of Science Fiction*. 2nd ed. New York: St. Martin's, 1993. Print.
- Cramer, Kathryn. "Hard Science Fiction." *The Cambridge Companion to Science Fiction*. Ed. Edward James and Farah Mendlesohn. Cambridge, UK: Cambridge UP, 2003. 186–96. Print.
- Csicsery-Ronay Jr., Istvan. *The Seven Beauties of Science Fiction*. Middletown, CT: Wesleyan UP, 2008. Print.
- Davenport, Basil. *Inquiry into Science Fiction*. New York: Longmans, Green and Co., 1955. Print.
- Gunn, James. Inside Science Fiction. 1992. 2nd ed. Lanham, MD: Scarecrow, 2006. Print.
- Heinlein, Robert A. "Pandora's Box." 1952. *Turning Points: Essays on the Art of Science Fiction*. Ed. Damon Knight. New York: Harper & Row, 1977. 238–58. Print.

Lem, Stanislaw. "On the Structural Analysis of Science Fiction." 1973. Trans. Franz Rottensteiner et al. *Microworlds: Writings on Science Fiction and Fantasy*. Ed. Franz Rottensteiner. New York: Harvest/HBJ, 1984. 31–44. Print.

Luckhurst, Roger. Science Fiction. Malden, MA: Polity, 2005. Print.

Merril, Judith. "Introduction." SF: The Best of the Best. New York: Dell, 1967. 1–7. Print.

_____. "Introduction: Fish Out of Water, Man Beside Himself." *SF:12*. New York: Dell, 1968. 9–11. Print.

_____. "Summation: The Year in S-F." *6th Annual Edition: The Year's Best S-F*. New York: Dell, 1963. 374–78. Print.

- _____. "What Do You Mean: Science? Fiction?" 1966. SF: The Other Side of Realism: Essays on Modern Fantasy and Science Fiction. Ed. Thomas D. Clareson. Bowling Green, OH: Bowling Green U Popular P, 1971. 53–95. Print.
- Parrinder, Patrick. "Science Fiction and the Scientific World-View." *Science Fiction: A Critical Guide*. Ed. Patrick Parrinder. London: Longman, 1979. 67–88. Print.
- Rieder, John. "On Defining SF, or Not: Genre Theory, SF, and History." *Science Fiction Studies* 37.2 (July 2010): 191–209. Print.
- Schmidt, Stanley. "The Science in Science Fiction." *Many Futures, Many Worlds: Theme and Form in Science Fiction.* Ed. Thomas D. Clareson. Kent, OH: Kent State UP, 1977. 27–49. Print.
- Wolfe, Gary K. *Evaporating Genres: Essays on Fantastic Literature*. Middletown, CT: Wesleyan UP, 2011. Print.
- Yaszek, Lisa. "Science Fiction." *The Routledge Companion to Literature and Science*. Ed. Bruce Clark with Manuela Rossini. New York: Routledge, 2011. 385–95. Print.

CHAPTER 2

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AESTHETICS

PETER STOCKWELL

SCIENCE fiction is extremely diverse as a genre, encompassing a wide range of narrative types and expressive patterns: you will find stories cast in the form of crime and detective puzzles, theological and philosophical explorations, ripping yarns, shoot-outs and battles, and meditative extrapolations; both pacy narrative drive and lyrical contemplation; characters that resonate as rich fictional people and characters that are everyman tokens and plot devices. You will find magical realism, modern gothic, postmodernism and the absurd, omniscient narration, and psychological stream of consciousness; the registers of action-adventure, experimental narrative, science, humor, and psychobabble; stories both heavy with demotic dialogue and elsewhere brimming with specialized terminology; and a rich and still expanding set of subgenres across the many media forms of print and screen. All of this diversity makes it very difficult to delineate a single unifying aesthetic that can be said to identify science fiction as a cultural phenomenon. However, it seems to me that this is a fault of our traditional understanding of aesthetics, rather than a problem unique to science fiction.

The term "aesthetics" gained widespread usage only in the late eighteenth century. At its most scholarly, aesthetics has been the term that encompasses discussions of artistic value, based on setting out the principles and beliefs that underscore a particular art object or movement: this is aesthetics as philosophy (see Janaway). At the same time, aesthetic discussions have often centered upon considerations of the nature of beauty and the measurement of a particular work of art: this is aesthetics as (literary) criticism (see Armstrong). The beauty or otherwise of an artwork can be considered not only in terms of its own properties or creative intentions but also for the effect it has on a viewer or culture: this approach treats the aesthetic value of a work in terms of its social impact. Finally, there is a sense in which the aesthetic of an object relates in journalistic and popular usage to the "look and feel" of the work: this is aesthetics as fashion.

Across these different senses and applications, there is a general set of uses that pertains to the internal properties and features of the literary text, and another related set that inclines toward the generic and social positioning of the work. To give a simple example, here are the openings to five short stories from the same collection by science fiction writer Roger Zelazny:

1. Roger Zelazny "The Doors of His Face, the Lamps of His Mouth" (1965):

I'm a baitman. No one is born a baitman, except in a French novel where everyone is. (In fact, I think that's the title, *We are All Bait*. Pfft!) How I got that way is barely worth the telling and has nothing to do with neo-exes, but the days of the beast deserve a few words, so here they are. (1)

2. "The Keys to December" (1966):

Born of man and woman, in accordance with Catform Y7 requirements, Coldworld Class (modified per Alyonal), 3.2-E, G.M.I. option, Jarry Dark was not suited for existence anywhere in the universe which had guaranteed him a niche. This was either a blessing or a curse, depending on how you looked at it.

So look at it however you would, here is the story. \dots (33)

3. "Divine Madness" (1966):

"... I is this? hearers wounded-wonder like stand them makes and stars wandering the conjures sorrow of phrase Whose..."

He blew smoke through the cigarette and it grew longer. (199)

4. "The Great Slow Kings" (1963):

Drax and Dran sat in the great Throne Hall of Glan, discussing life. Monarchs by virtue of superior intellect and physique—and the fact that they were the last two survivors of the race of Glan—theirs was a divided rule over the planet and their one subject, Zindrome, the palace robot. (181)

5. "A Rose for Ecclesiastes" (1963):

I was busy translating one of my *Madrigals Macabre* into Martian on the morning I was found acceptable. The intercom had buzzed briefly, and I dropped my pencil and flipped on the toggle in a single motion. (71)

On the social and cultural dimension, Zelazny is widely regarded as a "literary" science fiction author, with an MA in Renaissance literature and with a style of writing that often blended classical mythologies, literary allusion, and quotations from French, Latin, and Greek (see Lindskold). The first example above illustrates the blend of what appears to be scholarly and literate allusion with a demotic dialogic style, and even a science-fictional neologism ("neo-exes"). Excerpt 2 exemplifies the immersive and idiomatic style that can often be found in science-fictional openings. Like the first extract ("a few words, so here they are"), the introduction refers to itself as text ("here is the story"), which is both informal and self-consciously artsy, blending conversational idioms with technical terms that the experienced SF reader might decode: a genetically modified person in the form of a Cat suited for Alyonal, a cold planet that has 3.2 times the Earth's gravity.

Excerpt 3 is the most literate and self-conscious of all, with graphological marking drawing attention to the opening sentence in italics and reversed word-order: corrected, it is a quotation from Shakespeare's *Hamlet*. It retains internally the science-fictional suggestion in "stars," and then introduces an oddity in the sentence that describes the smoked cigarette growing longer. The reversal is iconic in the rest of the story, which deals with a character who—between seizures—lives backward through the immediate future, in what turns out to be a redemptive love story. Excerpt 4 displays the grandiose register of overblown mythological science fiction, quickly undermined in bathos. The final extract immerses the reader into the futuristic world, presented as if it were familiar—a common technique in SF that is here lyrically enriched with the alliterative "m" and the anachronistic blend of pencil and toggle.

These examples have been selected because they neatly illustrate—within one book several different features of science-fictional writing. Any comprehensive aesthetics of science fiction would have to allow a principled account of all of these features (and more) and also recognize that Zelazny is at one (literate and allusive) end of a spectrum that stretches to more action-driven and one-dimensional examples of formulaic genre fiction.

One possible way of dealing with genre diversity would be to work out different aesthetic principles for the different forms of SF. So we could explain separately the characteristically appealing features and effects of the writing of the interwar US pulp magazines, or the 1960s British New Wave, or cyberpunk in the 1980s, and so on. However, this approach neglects to recognize the intuitive sense shared by many readers that SF is generically and wholly a particular thing. Subgenres have family resemblance with each other, even if those at extended ends of the spectrum appear superficially dissimilar.

An alternative approach is to claim that SF is not easily amenable to the customary perspectives of literary scholarship, because the latter arose alongside a literature of character, a lyrical sensibility, and an artistic self-referentiality that has diverged from the history of SF writing. Science fiction therefore requires its own unique aesthetic account. The most famous proponents of this position are SF authors and critics Samuel R. Delany and Joanna Russ. Delany argues that science fiction is necessarily and by definition richer (an aesthetic judgment) than what he terms "mundane" fiction because of its greater potential for world-building, freed from the restrictions of the parochial and everyday. However, this position is an evaluation of *poetics* rather than aesthetics proper: the enhanced richness is a matter of larger scope for propositional content and meaning; Delany does not claim that SF allows a wider or qualitatively different intensity of emotional attachment than other literary art. Russ contrasts the emphasis and value placed in literary criticism on lyrical intensity with SF's "drastically different form of literary art" (112). She describes science fiction as essentially didactic rather than contemplative, with characters that are collective or representational rather than individual psychologies and with an emphasis on phenomena possessing a quality of almost religious awe. Criticism of science fiction cannot possibly look like the criticism we are accustomed to. It will-perforce-employ an aesthetic in which the elegance, rigorousness, and systematic coherence of explicit ideas is of great importance (Russ 118).

This position might appeal to anyone with a contrarian streak who enjoys being an SF fan as an act of alterity, but it smacks of special pleading. Rather than engaging with the common processes of aesthetic reception all art shares, treating SF as aesthetically sui generis only serves to marginalize it further. It is not psychologically plausible to imagine a separate type of reading and appreciative process evolved solely for SF, and it is not socially plausible to separate SF out from the continuity of human experience. For her part, Russ points out the similarities between medieval literature and science fiction (indeed, it is notable that many SF scholars, such as Edward James and Tom Shippey, are also medievalists). Medieval and science-fictional literature share, she claims, many features of didacticism and exposition, everyman character tokens, materialism, and a "sense of wonder"-the last named capturing their common aesthetic effect. However, this continuity undermines the argument that SF needs to be treated differently from other forms of literary art. Later in this chapter, I suggest three ways that science fiction is aesthetically engaging, ways that are common to all other forms of literature; but it is worth arguing at this point that there are good theoretical reasons for asserting this continuity.

From classical times up until the early modern era, beauty has largely been understood in terms of proportion, balance, harmony, planned design, and symmetry. Ugliness in this understanding is not a thing in itself but a turning away from beauty, a failure of proportion, balance, and so on. Nonbeauty is therefore formless. In our contemporary terms, we might say that beauty has been understood as figure (a good, well-formed gestalt shape) possessing psychological prominence and attraction, while nonbeauty has been conceived as ground (the indistinct, property-less background that simply defines the space behind the figure). Much of what we would now call aesthetics scholarship, from Plato and Aristotle to St. Thomas Aquinas and St. Bonaventure, was concerned with setting out the rules and principles for achieving artistic beauty in literature, painting, sculpture, architecture, landscape, and so on. Up until the seventeenth century in Western philosophy, beauty was a matter of identifying and articulating prescriptive rules, even if those prescriptions were based on an educated consensus of what constituted beautiful objects.

During the late Renaissance and into the Enlightenment, observations on aesthetics take a turn toward a more subjective understanding that we might recognize as modern: beauty is not (just) a property of objects but a perceived property. Differences in feeling become important in delineating and categorizing different aesthetic effects. So Edmund Burke, for example, differentiates between the beautiful and the sublime as mutually exclusive effects: the sublime allows for intensity of feeling caused by pleasurable terror at immensity or transcendence. He also emphasizes the personal and subjective in understanding such feelings and the power of language to convey them:

Certain it is, that the influence of most things on our passions is not so much from the things themselves, as from our opinions concerning them; and these again depend very much on the opinions of other men, conveyable for the most part by words only. (335) In his *Critique of Judgment* (1790), Kant also develops the distinction between beauty and the sublime by further subdividing the latter into the noble sublime, splendid sublime, and terrifying sublime. In maintaining this distinction, he proposes what we might now see as a very modern, cognitive psychological understanding of the perceptual basis of figure and ground: beauty is a judgment of an object in the world, while the sublime transcends objects and is a more formless and intense feeling.

This is a distinction in which the SF tradition from *Frankenstein* (1818) onward tends to come off badly, since SF is firmly placed in the sublime category. This is evident in the genre's key feature of awe-some-ness, sense of wonder, or what in mid-twentieth-century American SF was called the "gosh-wow!" effect (see Stockwell, *Poetics* 76–106). The reason this is a bad outcome for SF is that, by contrastive implication, it denies the genre access to the category of beauty. Even if beauty and sublimity are scaled prototypically along an axis, with one blending into the other as proposed by Schopenhauer, SF still remains located in both senses at the "other-worldly" pole with awe, terror, and wonder, rather than alongside lyric, passion, emotion, and other effects of pure observed beauty. Schopenhauer's sublime is self-effacing, as the observer forgets his or her own situation and is transported elsewhere in transcendence.

Now it must be said at this point that not all science fiction achieves this sort of sublimity! Part of the problem of the history of aesthetics is that commentary tends to be reserved for examples of high art, with the prescriptions expressed often functioning in a circular way to define what counts as value and what does not. Either way, SF loses out, being seen either as low art unworthy of scholarly study or else as a type of art that appeals to simple reason and childish wonder, rather than anything more resonant, tasteful, or emotionally sophisticated.

In a valiant attempt to reappropriate some of these values for SF, Istvan Csicsery-Ronay Jr. has set out what he calls the "seven beauties" of science fiction. His approach aims at description rather than prescription, though there is certainly a sense that he intends a persuasive element to his scheme:

Rather than a program-like set of exclusive rules and required devices, this mode is a constellation of diverse intellectual and emotional interests and responses that are particularly active in an age of restless technological transformation. I consider seven such categories to be the most attractive and formative of science-fictionality. (5)

His seven beauties are: the SF sublime, the SF grotesque, imaginary science, future history, fictive neology, the fictive novum, and the technologiade. It should be immediately clear that most of these features primarily concern poetics (content and technique) rather than aesthetics (effect), though one of the attractive aspects of Csicsery-Ronay's scheme is the implicit assertion that technique and effects cannot be neatly separated. His set of features is also presented as a "constellation" rather than necessary criteria, so different SF works will possess different combinations of these aspects. Csicsery-Ronay's features represent the elements that differentiate SF from other forms of literature. In this respect, and in spite of its advance on earlier delineations of the genre, it functions still as an argument for SF as special, odd, or deviant, separated from other literary art, even as it promotes this otherness as valuable.

Instead, we might turn to our current best understanding of the psychological processes of literary appreciation to construct an aesthetics of science fiction. Though there has been a shift in aesthetic theory from prescription to description, the prescriptive tradition remains alive in journalistic and popular discourses that defend differences between high and low culture, whereas most modern scholarly work in aesthetics is concerned with the anthropology and social psychology of artistic value, or with the comparative study of art across cultures and histories, and is mainly descriptive. However, even the most anthropologically descriptive discussion of aesthetics has a persuasive element, indicating that aesthetics as a field is neither purely objective nor subjective but necessarily *intersubjective*. As a result, we need to draw on those aspects of human experience that are common to us, while trying to describe them in as transparent and systematic a way as possible. The best current framework for achieving this resides in the insights for art and literature emerging from cognitive science (see Hogan; Stockwell, *Cognitive*).

The cognitive turn in the humanities rejects Cartesian dualities of mind and body, reason and emotion, poetics and aesthetics. These are replaced by continuities such as the embodied mind, the interanimation of meaning and feeling, and the assertion that our processes and experiences of life and art are not separate. In essence, real emotion and literary emotion, real people and literary characters, remembered experiences and recounted experiences are processed very similarly, with the only difference being their ontological status. One consequence is that science-fictional aesthetics cannot be treated separately from literary aesthetics, because literary feeling is still fundamentally the same as feeling in general (see Stockwell, *Texture*). We can identify—drawing on cognitive science—the common aesthetic patterns that SF shares with other art and experience in general; and we can also identify the particular patterns of science-fictional singularity.

For example, it is clear from different sources such as gestalt psychology and the cognitive psychology of visual perception that certain shapes and concepts are universally regarded as more attractive than others, in the sense both of attracting attention and being aesthetically appealing (see Stafford; Styles). And it is possible to apply the same principles to the effects of literary reading to produce a usable toolkit of the linguistic features of good attractors in a literary text. Literary works exploit these linguistic resources to generate aesthetic effects in readers, and these patterns are as effective in science fiction as in other forms of literature. This is not to say that SF is identical to other forms of literary art, of course: the task of the literary critic ought to be in identifying where SF draws on culturally shared aesthetic patterns as well as identifying where SF adapts those patterns in a singular way. The literary critic needs to be adept at a close cognitive poetic analysis of style as well as aware of aspects of literary historiography and both scholarly and popular reception. This ideal critic should blend—in a way that can itself be seen as science-fictional—scientific awareness and cultural sensibility.

The distinction between beauty and wonder only works for a narrow understanding of experience and in relation to a (self-defined) narrow section of artistic enterprise. Instead, I would like to propose the encompassing notion of *compulsion* as the power that literary reading generates. This is the feeling that the book is compelling and gripping, important beyond its mere materiality or the world it designates, and the feeling that readers are transported or self-effaced or transformed in the process (see Gerrig). Science fiction—at least, those works that people think of as good science fiction—is compelling in this sense, just as much as any sort of literature can be. At its best, it is utterly compelling to the point of enthusiastic immersion.

Understanding SF aesthetics as a compulsive effect requires a holistic grasp of its textual and narratological features together with the creative enrichment and enthusiasm brought by its readers. Science-fictional sublimity and beauty are thus essentially different emphases for the same phenomenon. In the rest of this chapter, I outline very briefly and mainly by example three forms of beauty in which science fiction excels: beauty of expression, beauty of structure, and beauty of world.

Science fiction is not generally regarded as poetic in the common sense, though in fact I would argue that the creative neologism and fictive novum identified by Csicsery-Ronay are poetic forms of expression at different levels that are more richly exploited in SF than in other genres. Nevertheless, there are examples of great poetic and lyrical writing in the SF canon. The obvious example is the prose style of Ray Bradbury, an appreciation of which grows the more closely it is examined. Consider this example from "The Golden Apples of the Sun" (1953):

The captain stared from the huge dark-lensed port and there indeed was the sun, and to go to that sun and touch it and steal part of it forever away was his quiet and single idea. In this ship were combined the coolly delicate and the coldly practical. Through corridors of ice and milk-frost, ammoniated winter and storming snow-flakes blew. Any spark from that vast hearth burning out there beyond the callous hull of this ship, any small firebreath that might seep through would find winter, slumbering here like all the coldest hours of February. (*Golden Apples* 165)

The success of this passage lies in its aptness at the semantic level and its balance at the syntactic level. The poetically striking nature of its meaning is carried by the metaphors: some compressed as noun-phrase modifiers ("milk-frost"), others displaying empathetic personification ("callous hull"), or both of these qualities together as a personifying lexical blend ("firebreath"); there is metaphor as explicit analogy ("like all the coldest hours") and other examples in which the referential target of the metaphor remains stylistically invisible but still present ("that vast hearth"). This metaphoric exuberance is not simply a modernist technique for its own sake: the short story itself (like much SF) literalizes a metaphor—about going to the sun—and does it by overlaying a science-fictional spaceflight scenario onto W.B. Yeats's poetic lines "And pluck till time and times are done, the silver apples of the moon, the golden apples of the sun." The sense of space-travel motion, delicacy, and the contrast of the safe interior

and sublimely dangerous exterior are captured in the continuous feeling of the additive syntax and the locative expressions ("that sun" in contrast to "slumbering here") and the spatial prepositions ("from," "Through," "beyond"). In one paragraph, Bradbury conveys not simply the denotation of the story but the sensation of it simultaneously. He even deploys /k/ and /l/ sounds systematically throughout to associate these sounds iconically with coldness.

The following passage from Bradbury's 1950 novel *The Martian Chronicles* is even more striking:

They had a house of crystal pillars on the planet Mars by the edge of an empty sea, and every morning you could see Mrs. K eating the golden fruits that grew from the crystal walls, or cleaning the house with handfuls of magnetic dust which, taking all dirt with it, blew away on the hot wind. Afternoons, when the fossil sea was warm and motionless, and the wine trees stood stiff in the yard, and the little distant Martian bone town was all enclosed, and no one drifted out their doors, you could see Mr. K himself in his room, reading from a metal book with raised hieroglyphs over which he brushed his hand, as one might play a harp. And from the book, as his fingers stroked, a voice sang, a soft ancient voice, which told tales of when the sea was red steam on the shore and ancient men had carried clouds of metal insects and electric spiders into battle. (14)

The long syntactic addition, coordination, and compounding in each of these three sentences literally take your breath away when the passage is read aloud. Each added phrase is framed definitely and by precise specification, so the effect is of assuming a familiarity with golden fruits and crystal walls that only increases the thrilling alienness of the metal insects and electric spiders from ancient Martian history. Again, Bradbury sets up particular consonant clusters (/kl/, /dz/, and /tl/) that echo through the passage and bind it together subliminally, so that when these phonetic patterns reach a crescendo in the final lines, the reference to ancient history appears to be prefaced by the future in a peculiarly iconic science-fictional manner.

Examples such as these are not restricted to Bradbury: any list would only make a start with the stylistic richness of Brian W. Aldiss, Kurt Vonnegut, Charles Stross, Ursula K. Le Guin, Russell Hoban, Octavia Butler, Jeff Noon, Margaret Atwood, and scores of others—prose styles of intricacy, poetic resonance, and thematic relevance that are the equal of any literature. SF poetic style is often motivated and immediately thematically relevant to the world being evoked, rather than being an experiment in artistic self-referentiality; this is what distinguishes the wildly creative stylistic experimentation of Aldiss's *Barefoot in the Head* (1969) from James Joyce's superficially similar *Finnegans Wake* (1939).

SF poetic style often serves an immersive function, placing the reader's interior narrative voice (as narratee or implied reader) into a position of assumed familiarity with the imagined world. William Gibson's style is often cited as the paradigmatic example of this, though, in fact, it is pervasive in SF. The effect is often conversational, intimate, and slick—rendering an impression of SF style as cool. This Gibsonesque extract is from John Brunner:

At present I am being Arthur Edward Lazarus, profession minister, age forty-six, celibate: founder and proprietor of the Church of Infinite Insight, a converted (and what better way for a church to start than with a successful conversion?) drive-in movie theatre near Toledo, Ohio, which stood derelict for years not so much because people gave up going to the movies—they still make them, there's always an audience for wide-screen porn of the type that gets pirate three-vee satellites sanded out of orbit in next to no time—as because it's on land disputed between the Billykings, a Protestant tribe, and the Grailers, Catholic. No one cares to have his property tribaled. However, they normally respect churches, and the territory of the nearest Moslem tribe, the Jihad Babies, lies ten miles to the west.

My code, of course, begins with 4GH, and has done so for the past six years.

Memo to selves: find out whether there's been any change in the status of a 4GH, and particularly whether something better has been introduced . . . a complication devoutly to be fished. (5)

This is a style on the boundary of recognition, not so far from contemporary idiom as to be obscurely alien, but sufficiently unfamiliar to feel as if you are inhabiting another mind. The efforts of decoding required here ("three-vee," "tribaled," "4GH") maintain the self-awareness that there is a tension between the reader's world and the narrator's, and this dialogic pattern is a significant part of the characteristic SF aesthetic.

The second aesthetic characteristic of science fiction I will examine is beauty of structure. The narrative drive of most SF is part of its compelling nature: SF texts are often page-turners, with a resolution, dilemma, or catastrophe to be fulfilled or averted. Most science fiction is end-directed, and rarely if ever ends in the sort of aporia that is characteristic of many modernist short stories and postmodern novels. Even where the end of an SF story is not resolved, such works tend to close with apocalypse or a gesture toward transcendence. Arthur C. Clarke's work provides good examples of this, especially his 1953 novel *Childhood's End* and both the screenplay and novelization of *2001: A Space Odyssey* (1968). The former ends with a witness escaping the apocalypse on Earth and the latter ends with a witness attempting to articulate transcendence.

SF literary narrative has been deeply influenced by cinematic editing techniques: flashbacks, parallel storylines, a strong third-person narrative voice, and other features are part of the shared poetic techniques of both art-forms, and the aesthetic experience of both can also be regarded as somewhat comparable. Such structural fragmentation in the context of SF narrative resolution tends to be felt not as disjunction, as it might in another genre, but as a sense of paciness and excitement. The work of China Miéville provides good examples of this. *The City and the City* (2009) begins as a detective novel, but the peculiarity of the setting soon distracts the reader: one city is overlaid on another, occupying the same space, with each population prohibited (apparently by threat of alien punishment) from seeing the other city. The murder inquiry ensures the novel is a page-turner, but the achievement of the work lies in the way it lines up crime story, political satire, ontological contemplation, and uncertainty over whether the framework is science-fictional or psychological—and then fires each of these structures at the reader at once. *Kraken* (2010) similarly has a heist mystery at its heart, but quickly expands into a wild pursuit narrative that encompasses religion, politics, and magic.

Miéville's (2011) *Embassytown* displays all the features of beauty of structure, with an alien race whose language and thought are so intertwined that they cannot conceive of a lie or utter it. Human contact almost destroys their civilization, and the novel again combines politics, philosophy, and narrative excitement, with a brilliant resolution. As Ursula Le Guin said in her review of the novel:

Embassytown is a fully achieved work of art [that] . . . works on every level, providing compulsive narrative, splendid intellectual rigour and risk, moral sophistication, fine verbal fireworks and sideshows, and even the old-fashioned satisfaction of watching a protagonist become more of a person than she gave promise of being.

In science fiction, often, the narrative structure itself is sublime.

Finally, it is in the richness of its evocation of nonactual worlds that science fiction distinguishes itself from most other forms of literature. Most SF worlds are overengineered for the fictional purpose at hand, with a wealth of detail and texture that is not necessary for the mechanics of the plot or the enactment of meaning. Technologies are invented, named, and described even where they do not advance the story, civilizations appear that are incidental to the main account, languages are created that are sophisticated far beyond the requirements of the narrative at hand (see Adams). This richness of world-building is compelling and is one of the features that clearly makes authors return to their own invented universes to write sequels and sequences. There are numerous examples that are particularly rich and wide-ranging in historical and spatial sweep, such as the novels and novellas in Alastair Reynolds's "Revelation Space" series (2000-), or Iain M. Banks' "Culture" universe (1987-), or Isaac Asimov's "Foundation" and "Robot" series (1939-93). Although each book is self-contained, there is an additional pleasure for the reader who recognizes cross-textual references and the elaboration of motifs from elsewhere within the same universe. The literary theorist Gerard Genette proposed the term "architext" to account for the web of possibilities that any single literary work with all its intertextual and paratextual features could point toward, but science fiction materializes Genette's abstract notion. Not only do many SF sequences provide an overprofusion of elaborated detail for its own sake (Neal Stephenson's "Baroque Cycle" [2003-2004], for example), but they often also gesture toward an even richer, unstated universe than is actually described directly. Where in a realist and naturalist literary novel a reader focuses only on the imaginary setting within a backgrounded but indistinct familiar world, in a science-fictional universe the spaces between the worlds and each narrated setting are also available for readerly engagement. The aesthetic effect is often vertiginous, immersive, and overwhelming.

It is possible, then, to talk about the beauty of SF in terms that are not exclusive to the genre, that draw on our best current knowledge of the psychology of reading, and that are neither straightforwardly prescriptive nor merely descriptive. An analysis of the aesthetics of SF (or anything) needs to be based on human commonalities as well as on particular textual variations. Science fiction sometimes displays a beauty of style that can be poetic, iconic, and immersive. It can have a beauty of structure that engages a narrative drive, aims at a satisfying resolution, and feels pacy and urgent. And it characteristically evokes the beauty of the world in a rich immersion, architectural consistency, resonance, and persistence of effect. All of this makes science fiction a compulsive genre of literary art.

WORKS CITED

- Adams, Michael, ed. *From Elvish to Klingon: Exploring Invented Languages*. New York: Oxford UP, 2011. Print.
- Armstrong, Isobel. The Radical Aesthetic. Oxford: Blackwell, 2000. Print.
- Bradbury, Ray. "The Golden Apples of the Sun." *The Golden Apples of the Sun*. London: Hart-Davis, 1953. Print.
 - ___. *The Martian Chronicles*. 1950. London: Hart Davis, 1951. Print.
- Brunner, John. The Shockwave Rider. London: Dent, 1975. Print.
- Burke, Edmund. A Philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful. London: J. Dodsley, 1767. Print.
- Csicsery-Ronay Jr., Istvan. *The Seven Beauties of Science Fiction*. Middletown, CT: Wesleyan UP, 2008. Print.
- Delany, Samuel R. *The Jewel-Hinged Jaw: Notes on the Language of Science Fiction*. Elizabethtown, NY: Dragon, 1977. Print.
- Genette, Gérard. *The Architext: An Introduction*. 1979. Trans. Jane E. Lewin. Berkeley: U of California P, 1992. Print.
- Gerrig, Richard. *Experiencing Narrative Worlds: On the Psychological Activities of Reading.* New Haven, CT: Yale UP, 1993. Print.
- Hogan, Patrick Colm. *Cognitive Science, Literature, and the Arts*. New York: Routledge, 2003. Print.
- Janaway, Christopher. *Reading Aesthetics and Philosophy of Art.* Oxford: Blackwell, 2006. Print.
- Le Guin, Ursula K. Review of China Miéville's *Embassytown*. *The Guardian* (May 6, 2011). Web. July 20, 2013. http://www.guardian.co.uk/books/2011/may/08/embassytown-ch ina-mieville-review.
- Lindskold, Jane M. Roger Zelazny. New York: Twayne, 1993. Print.
- Russ, Joanna. "Toward an Aesthetic of Science Fiction." *Science Fiction Studies* 2.2 (July 1975): 112–19. Print.
- Stafford, Barbara Maria. *Echo Objects: The Cognitive Work of Images*. Chicago: U of Chicago P, 2007. Print.
- Stockwell, Peter. Cognitive Poetics. London: Routledge, 2002. Print.
- _____. *The Poetics of Science Fiction*. London: Longman, 2000. Print.
- _____. Texture: A Cognitive Aesthetics of Reading. Edinburgh: Edinburgh UP, 2009. Print.

Styles, Elizabeth. The Psychology of Attention. 2nd ed. Hove: Psychology Press, 2006. Print.

Zelazny, Roger. "Divine Madness." *The Doors of His Face, the Lamps of His Mouth, and Other Stories*. London: Faber and Faber, 1971. 199–206. Print.

____. "The Doors of His Face, The Lamps of His Mouth." 1965. *The Doors of His Face, the Lamps of His Mouth, and Other Stories*. London: Faber and Faber, 1971. 1–32. Print.

____. "The Great Slow Kings." 1963. *The Doors of His Face, the Lamps of His Mouth, and Other Stories*. London: Faber and Faber, 1971. 181–88. Print.

_____. "The Keys to December." 1966. *The Doors of His Face, the Lamps of His Mouth, and Other Stories*. London: Faber and Faber, 1971. 33–56. Print.

_____. "A Rose for Ecclesiastes." 1963. *The Doors of His Face, the Lamps of His Mouth, and Other Stories*. London: Faber and Faber, 1971. 71–106. Print.