

# Practices of Speculation

## An Introduction

---

*Jeanne Cortiel, Christine Hanke, Jan Simon Hutta, and Colin Milburn*

May 2020. As we write this introduction, the COVID-19 pandemic has covered the world. Drastic political measures to contain the virus have followed, appearing already belated and inadequate even as they envision a future after the current crisis. With notable national and regional differences, the policies and practices implemented to deal with the spread of the virus act like magnifying glasses, illuminating the social and economic power relations of the Global North and Global South more clearly than ever before, while also highlighting the fissures and tensions where things may fall apart entirely. The most conspicuous of these breaking points include, for example, the insistent growth paradigm of neoliberal economics; the processes of transnationalization and re-bordering; the evolving role of spatial proximity for social networks and personal relationships, now articulated through the clumsy expression of “social distancing”; the preservation of civil liberties in the midst of massive data collection and surveillance; the relationship between science and politics; and the increasingly significant role of digital media and software platforms for civic participation and cultural belonging. Not least, the pandemic has reconfigured social, political, and ecological temporalities, provoking at the same time the invocation of past events, manifold scenarios of future developments, and calls for immediate action—often coexisting in different contexts. These responses endow the ongoing debate around climate change with a new sense of urgency, even while they tend to eclipse it. This is a moment of crisis writ large, and its heightened uncertainties force us to suspend any illusions of autonomy to fully face the vulnerabilities of ourselves and our life-supporting systems. The future has opened up in radically novel ways, and the speculative practices that give this volume its title become manifestly relevant.

As governments, health experts, companies, and investors struggle to gain control over a highly complex, already destructive situation, acts of speculation—particularly in the domains of economics and technoscience—are ubiquitous and proliferating. These speculations often take the form of colorful visualizations of data, for example, extrapolative maps and charts that appeal to the power of scientific evidence. But they also frequently latch onto apocalyptic, dystopian, and

utopian narrative traditions, highlighting the need for an interdisciplinary response. Even before the current pandemic, interdisciplinary scholarship has amply shown how viruses and other contagious entities animate scientific, political, literary, and popular media discourses in a peculiarly speculative manner.<sup>1</sup> Today, engulfed in discrepant narratives of the pandemic, social media and television broadcasts abound with claims of “fake news” and conspiracy theories, even while reporting the risk assessments and predictive models of scientific, economic, and political authorities. Virologists and epidemiologists have become the leading experts of the day, making the basic operational modes of scientific knowledge more visible than ever. However, the speculative dimensions of their response to COVID-19 underscore the stark, inexorable force of uncertainty, even as we turn to science for certain answers. The current volume is grounded in this premise: as a field of practices oriented towards the future, speculation runs on non-knowledge and uncertainty to produce new knowledge. Yet even as it turns to the future, speculation is bound to existing knowledge and, as such, belongs as much to history as to any eventual world to come.

Therefore, the perturbation of linear time that we see so clearly played out in the COVID-19 pandemic is also central to speculation in general. The relationship between past, present, and future—the basic structure of collective histories and life narratives—emerges as radically unstable. Politicians, medical and scientific experts, and the press alike frame the pandemic’s social realities—including the search for vaccines, treatments, and containment measures—in the language of ‘not yet.’ They couple the uncertainties of the current moment with a redemptive future, the contours of which tend to dissipate even as we imagine them. At the same time, researchers and reporters seek to document the course of the past, gathering anecdotes and data, visualizations and geographical mappings that meticulously trace the spread of the virus and its speed, the rates of infection and mortality, as well as the resilience of health care systems. Like the uncertain future, the past has not stopped assaulting the present. Squeezed between a radically contingent future and a past impossible to fix, the present has assumed the form of a speculative event.<sup>2</sup>

If the COVID-19 epidemic has unfolded through the speculative dimension of time, it has simultaneously revealed the workings of speculation on space. A health crisis that only weeks or days ago might have seemed far away suddenly presents itself as ‘right here.’ A tiny agent that implants itself in human bodies

1 For examples, see Treichler (1998); Mayer, R./Weingart (2004); Wald (2008); and Servitje/Vint (2016).

2 Here we are reminded of Deleuze and Guattari’s conceptualization of an “aeonic time” that “continually divides that which transpires into an already-there that is at the same time not-yet-here, a simultaneous too-late and too-early” (Deleuze and Guattari [1980] 2003: 262).

is subsequently confronted with the spatial technologies of national borders. Visualizations of the virus's geographic distribution, distinguishing countries and states with graded shades of red and other alarming colorations, appear both as awkward tools for a comparative analysis and as instruments for a re-nationalizing strategy that corresponds with the massive tightening of border controls. Quotidian practices of translocality and mobility that have structured daily life in the Global North for decades, even while remaining cruelly foreclosed in many parts of the world, suddenly return as newly configured threats. Meanwhile, space has itself become speculatively temporalized. The asynchronous arrival of the disease in different places has provoked a discourse of differential 'stages' of disease progression, such that, for instance, "[Italy's] future is in the process of becoming America's present" (Jordheim et al. 2020). The 'here' is mirrored by an asynchronous 'there.' What the COVID-19 pandemic has revealed about the temporalities and spatialities of speculation is not new; nevertheless, it has become newly existential for all of us.

As indicated in the heterogeneous policies and discourses galvanized by COVID-19, the anticipation of the future and the circumscription of the as-yet unknown are core functions of contemporary knowledge production, facilitated by methods of segmentation and linearization, derivation and projection. The tools, techniques, and habits of speculation have become indispensable for thinking and acting within systems of advanced capitalism everywhere, anywhere, across the board. Aligned with instrumental knowledge and financial calculus, speculation has been complicit in the generation of profit. The nexus of knowledge production and profit generation in capitalism is further imbricated with state, corporate, and private interventions designed to make the future both imaginable and manageable. However, while speculation has nourished visions of eternal growth and profitable futures for the few, strategies and tactics developed to resist such visions have also relied on speculation. For example, in the COVID-19 pandemic, glimpses of different, alternative ways to inhabit the relation to past and future have also emerged. When several European states surprisingly interrupted harsh austerity politics, or when the U.S. government ordered firms to change their production to health-related equipment, or when calls to re-localize circuits of production and consumption grew louder, or when neighbors organized to assist the homeless and other vulnerable populations, the future began to mutate, opening different horizons, responding to practices hitherto often rejected as unrealistic, unviable, or 'socialist.'

A particularly strong case for a mode of speculating that escapes the mantra of growth and profit has been articulated in the manifesto *Rethinking the Apocalypse* (2020) by the North American indigenous collective Indigenous Action. Challenging hegemonic narratives of the disease that construct a linear story in which heroes of the Global North are called on to save 'the world,' the authors note,

From religious tomes to fictionalized scientific entertainment, each imagined timeline constructed so predictably; beginning, middle, and ultimately, The End. [...] It's an apocalyptic that colonizes our imaginations and destroys our past and future simultaneously. It is a struggle to dominate human meaning and all existence. [...] This is the futurism of the colonizer, the capitalist. It is at once every future ever stolen by the plunderer, the warmonger and the rapist. [...] Apocalyptic idealization is a self-fulfilling prophecy. It is the linear world ending from within. (Indigenous Action 2020)

Against a linear sequence running from a definite past to a predictable future, the activists call for a folding of temporality, invoking ancestral prophecies enunciated in the midst of violence and exploitation: “Now. Then. Tomorrow. Yesterday.” This powerful intervention into the rampant discourses around COVID-19 brings into relief another mode of speculating and, along with it, another set of speculative practices.

The uncertain commons collective, in their manifesto *Speculate This!* (2013), has provided a lucid rendition of such diverging modes of speculation. Taking clues from Nietzsche, Spinoza, Bataille, and Derrida, the authors propose a distinction between *firmative speculation* and *affirmative speculation*. Firmative speculation is about “turning uncertainty into (external, calculable, knowable) risk,” whereas affirmative speculation leaves the future open, thriving on uncertainty, and it “progresses and lives by attending to what it does not know” (uncertain commons 2013: ch. 2). While the firmative mode predominates, casting futurity primarily in terms of technological progress, economic growth, and a prolongation of the status quo, the affirmative mode instead characterizes diverse efforts to invent alternatives, for example, in philosophy and the arts—especially in the domains of speculative fiction—but also in postcolonial and decolonial projects, environmental justice efforts, experiments in permaculture, antiracist worldmaking strategies, and all manner of activist agitations that insist another world is possible.<sup>3</sup>

Affirmative speculation, in this sense, is about habits and practices opening towards a future that is not only uncertain, but radically contingent: a future that is not turned into an extension of the present, but that bears the promise of genuine novelty and difference in relation to what can presently be known and predicted. Affirmative speculation, it seems, is what a radical politics of difference—radically postcapitalist and decolonial—needs, at least, to think that things could be otherwise.

3 See for example, Fisher/Ponniiah (2003); McNally ([2002] 2006); Juris (2008); Bryant/Srnicke/Harman (2011); Otto (2012); Davis/Turpin (2015); Wilkie/Savransky/Rosengarten (2017); Bahng (2018); Jerng (2018); Milburn (2018); Streeby (2018); Chua/Fair (2019); Chang (2019); and Jue (2020).

Ambivalences, paradoxes, and indeterminacies remain, however, as already implied in the intellectual genealogy invoked by the uncertain commons. The two modes, while analytically useful, are inseparable regarding relations of knowledge production and politics. If imaginative, experimental, and performative practices of speculation have helped to animate insurgent movements from Haiti to the Arab Spring, Gezi protests in Turkey, or the Movement for Black Lives, it was also affirmative modes of speculation in relation to the unknown—hopes, dreams, and desires, as well as fears—that characterized colonial projects of exploration in early modernity. Likewise, the supposedly ‘post-truth’ situations propagated by Donald Trump, Jair Bolsonaro, and the Brexiteers cannot straightforwardly be captured in terms of a firmative mode of speculation that seeks to make uncertainties manageable—even though their affirmations of chaos and uncertainty clearly expose firmative orientations on other levels.<sup>4</sup> Whose purposes affirmative speculation serves and how it is interlaced with firmative processes thus remains an uncomfortable question.

Consider, for example, that firmative ways of speculating have acquired renewed relevance in activist strategies to counter ‘alternative truth’ and anti-science claims, such as those that run riot in the climate-change-denial movement. In her seminal theorization of situated knowledges, Donna Haraway formulated precisely this paradox of “how to have *simultaneously* an account of radical contingency for all knowledge claims and knowing subjects [...] *and* a no-nonsense commitment to faithful accounts of a ‘real’ world” (Haraway 1988: 579). With respect to the current situation of the COVID-19 pandemic—the moment when we write these words in our separate homes, in different countries, practicing prophylactic social distancing—the different national political strategies cannot in all cases be pinned down as instances of purely firmative or affirmative speculation. For example, some of these strategies enact a “precautionary principle,” according to which it is precisely the lack of knowledge about the future that prompts preventive action. As Matthew Hannah, Jan Simon Hutta, and Christoph Schemann explain, “Many experts in the current crisis thus cite the limits of their own knowledge as a reason not for refraining from action but, on the contrary, for quarantine and the closing of borders” (Hannah/Hutta/Schemann 2020). Rather than making the endeavor to overcome uncertainty their prime objective and to close down an

---

4 Discussing Bolsonaro’s government, Marcos Nobre (2019) has used the term “chaos as method” (cf. Meyer and Bustamante 2020). The calculated production of chaos and uncertainty, while seeming to affirm and promote contrarian beliefs, conspiracy theories, and other flights of speculative fancy, simultaneously aims to lock down the future, restore order, and return things to an imagined stability, remaking the future as an image of the past (“Make America great again,” “Make Brazil great again,” etc.).

uncertain future, these experts affirmatively posit their own irredeemable lack of knowledge as grounds for firmative recommendations.

Such simultaneity of different modes of speculation also shapes discussions about the legacies-to-be of the pandemic containment practices. On the one hand, firmative statements proliferate, ranging from stark warnings that the translocation of everyday life to online platforms will only fortify the neoliberal economy and enable increasingly comprehensive surveillance, to optimistic assurances that the widespread embrace of digital technologies and practices will ultimately improve social relations. On the other hand, some speculations have taken a more affirmative tack, welcoming the uncertainty that ensues from the fact that ‘nobody knows’ how we will come out of the crisis, imagining innovative possibilities for shifting power to the people and enhancing democratization (cf. Diez/Heisenberg 2020). But the “Amazonification of the planet” (Merchant 2020), a process that has been accelerating during the pandemic, depends as much on the interplay between closure and openness as does any utopian vision of a more egalitarian society to come after the pandemic. Much commentary has therefore combined firmative and affirmative (as well as anti-speculative) modes (cf. Strick 2020). It seems, then, we are situated in a historical moment when both modes are more interwoven than ever. Our aim, therefore, is not simply to pit the affirmative against the firmative, but rather to use this distinction as a heuristic for considering different ways of inhabiting the future-oriented present, a provocation for further enquiries into the material effects of speculation in specific contexts.

Since the eighteenth century, the profound transformation of scientific knowledge production in the context of industrialization has fundamentally shaped the development of the Global North: statistical and probabilistic thinking emerged hand in hand with mechanical objectivity, the projection of the Gaussian error curve onto social and natural phenomena, and the introduction of increasingly vast data practices into the arenas of science, politics, administrative governance, and civic life.<sup>5</sup> While these epistemic innovations have often seemed to disavow and exclude speculation, they nevertheless introduced new, data-driven modes of extrapolation, anticipation, and prediction into knowledge processes. Probabilistic theories and statistical methods came to permeate scientific knowledge, dissolving essentialist conceptions of law and causality while refurbishing notions of randomness and chance. The advent of quantum theory in the twentieth century likewise infused indeterminacy and uncertainty into the foundations of physics. These developments in the sciences, in parallel with the spreading tendrils of technological modernization and financial capitalism, created the conditions for a massive reorganization of epistemic fields and social orders around actuarial

---

5 See Porter (1986); Daston (1988); Hacking (1990); Desrosières ([1993] 1998); Daston/Galison (2007); and Link (1996, 2004a, 2004b, 2004c, 2004d).

logics, stochastic models, and risk assessments—that is, the emergence of risk society.<sup>6</sup>

In this context, since the late twentieth century, the operations of science, technology, medicine, and public health have become increasingly entwined with the speculative economies of the market, with all its attendant instruments of insurance, hedging, futures trading, and arbitrage, articulated in the grammar of forward-looking statements.<sup>7</sup> On the flip side, in the realm of economics and economic behaviors, historical shifts in attitudes toward speculation and investment, as well as alternating positive and negative assessments and the scientification of finance markets, have evolved in concert with probabilistic and metrical ways of knowing (Stäheli [2007] 2013). The transformation of “investors into scientists bound to discover the hidden, objective laws of financial investments” (Preda 2005: 152) has resulted in characteristic speculative labor practices, for example, in stock exchanges and algorithmic finance markets (Zaloom 2004, 2005). At the same time, it has become clear how closely financial speculation in global capitalism has been linked to colonialism and its legacies, including exploitative, extractive methods of medical, environmental, and technological experimentation, debt-trap investment schemes, and the global shuffling of supply chain derivatives.<sup>8</sup> Buoyed by such ventures and enterprises, financial markets—which are “not primarily concerned with the production of goods or with their distribution to clients but with the trading of financial instruments not designed for consumption” (Knorr Cetina/Preda 2005: 4)—thrive on their own promissory condition, their own subjunctivity. Conjured forth by the abstract models and theoretical conceits of economics, the performance of financial markets—indeed, the financialization of culture as such—relies deeply on imaginary visions of the future, in other words, speculative fictions.<sup>9</sup>

Speculative fictions—including the genres of utopian romance, scientific romance, extraordinary voyages, science fiction, science fantasy, weird tales, supernatural horror, fantasy, and alternate history—are devices for rendering two predominant types of speculation into narrative discourse: (1) extrapolation,

6 On risk society and its manifestations in technoscience, popular media, and environmental discourse, see Beck ([1986] 1992); Mayer, S./Weik von Mossner (2014); and Ghosh/Sarkar (2020). On the functions of uncertainty, indeterminacy, and risk in cultures of statistical knowledge production, see Hanke (2007, 2014); Bauer/Olsén (2009); Hannah (2010); and Jordan/Mitterhofer/Jørgensen (2018).

7 See Sunder Rajan (2006); Waldby/Mitchell (2006); Fortun (2008); Cooper (2008); Dumit (2012); Milburn (2015); and Patel (2017).

8 See Mitchell (2002); LiPuma/Lee (2004); Mignolo (2011); Bear/Birla/Puri (2015); Tilley (2011); Beisel/Boëte (2013); Peterson (2014); Chandler/Beisel (2017); and Mavhunga (2018).

9 See Callon (1998); Maeße/Sparsam (2007); Lütz (2007); MacKenzie/Muniesa/Siu (2008); Beckert (2016); Appadurai (2013); and Bear (2020).

which addresses the question, “What if this goes on?” based on what is “known to be known”<sup>10</sup>—whether in science or otherwise—and (2) a more open form of speculation that asks, “What if ...?” without such constraints.<sup>11</sup> As cultural devices, speculative fictions have, since the origins of modern science, contributed to production of scientific knowledge and technical innovations.<sup>12</sup> At the same time, speculative fictions have helped to shape social imaginaries toward the possibility of radical change and political renovation—precisely by estranging the present from itself, remaking our world into the past of an altered future or the foil to a wholly alternative world.<sup>13</sup> As writers such as Judith Merrill and Joanna Russ have famously suggested, speculative fictions are not constrained to particular forms or styles of speculation, for they can capaciously experiment with any number of speculative modalities.<sup>14</sup> For this reason, speculative fictions prove to be exquisite instruments for refracting the manifold practices of speculation that constitute the world today—the proliferating speculative markets, the forces of preemptive securitization, and the actuarial projections of pandemic pandemonium, as much as the longing for things to be otherwise.<sup>15</sup>

Considering how central speculation has become to all areas of our social, political, cultural, and personal existence, systematic exploration of the grammars, modes, and functions of speculation across these domains appears necessary. Such has been the motivation of this essay collection: to analyze speculation—whether in technoscience, finance, or fiction—as implemented by concrete practices, instantiated in particular forms of discourse, media apparatuses, techniques of application, and everyday activities.

## Tracing the Practices of Speculation

Speculation ventures to create knowledge by conjecturing what may come, but it is not exclusively directed towards the future: societies speculate backwards and sideways as well as forwards and beyond. The aim of this book is to think about speculation in more expansive ways at a time when the anticipation of catastro-

10 This is Samuel Delany's phrase, according to Joanna Russ ([1971] 1972).

11 See Landon (2014); cf. Csicsery-Ronay (2008); Saler (2012).

12 For examples, see Penley (1997); Turney (1998); Hayles (1999); Doyle (2003); Kilgore (2003); Squire (2004); Willis (2006); Clarke (2008); Franklin ([1988] 2008); Milburn (2008, 2015); Wald (2008); Sharp (2018); and Rees/Morus (2019).

13 See Jameson (2005); cf. Freedman (2000); Sargent (2010); and Levitas (2013).

14 See Merrill ([1966] 2017); Russ ([1971] 2017); cf. Cortiel (1999).

15 See Vint (2015); Carroll/McClanahan (2015); Haraway 2016; Higgins/O'Connell (2019); and Milburn (2020).



phe is the order of the day and an apocalyptic tone pervades public discourse on a global scale. Picking up the distinction between firmative and affirmative modes of speculation, this book proposes an approach that investigates the concrete ways in which these modes are enacted in practice, how they are sometimes differentially favored or mutually combined or rendered indistinguishable, as well as the entanglements and effects to which they give rise. While the essays collected here were written prior to COVID-19, at a moment when the image of global pandemic still resided in the ‘there and then’ instead of the ‘here and now,’ they bring into strong relief some of the speculative practices that have also shaped the current crisis.

This volume is the product of a long-standing cooperation between scholars at the University of Bayreuth and the University of California, Davis focusing on “cultures of speculation.” The contributions, some of them coauthored across disciplines, examine an assortment of speculative practices from different angles, attending to the ways in which speculation opens new vantages and vistas, a spectral panoply of firmative and affirmative horizons.

*Practices of Speculation* represents an adventure in interdisciplinary collaboration, the outgrowth of our collective effort to rethink conceptualizations of speculation in and beyond our respective disciplines, across different academic cultures. Several of the chapters were written as methodological mashups by co-authors from different fields, but even the single-author chapters position themselves across fields and cultures of research. Moreover, the entire collection bears traces of the innumerable conversations we have had as a group of friends and colleagues working and thinking together for more than a decade.

To move towards a fuller sense of how speculation operates through situated practices, we have grouped the chapters into three sections: (1) Modeling: Speculating with Data; (2) Embodiment: Speculating with Matter; and (3) Figuration: Speculating with Fiction. These three kinds of speculative practices—all of which can exhibit firmative and affirmative modes—are not mutually exclusive, but they each have a distinctive manner of establishing relations between the known and the unknown.

*Modeling* uses data to develop descriptive or visual accounts of possible states of affairs. It thus draws on facticity to describe possible actualities. *Embodiment* concerns the ways in which specific materials, beings, and environments—for example, the subjects and objects of a scientific laboratory or a theater space—are mobilized to enact speculative processes and promissory visions, opening to futurity. *Figuration*, in turn, draws attention to practices of make-believe that speculate through the gathering and condensing of disparate signifying elements—whether images, words, scenes, or narratives. Each of these practices of speculation—modeling, embodiment, figuration—entails different processes of worldmaking, which we analyze from different disciplinary angles. The individ-

ual chapters provide paradigmatic glimpses of particular situated practices, but collectively, the book aspires to provoke discussion rather than provide an exhaustive survey.

While speculation has been endemic to the expansion of global capitalism, speculation as a practice of dealing with the unknown past, future, and present goes back deep into history—and this history shapes the contours and affordances of speculation today. The first chapter of this collection, Susanne Lachenicht's "Cultures of Speculation—Histories of Speculation," historicizes our approach to speculation by looking into early modern chronotopes and perspectives on speculation, how they evolved with the Renaissance and in the context of European voyages of exploration. Not only the development of probability and risk calculus but also literary genres such as travel narratives and utopian romances show how much the period between the fourteenth and the nineteenth centuries generated a broad range of speculative practices. Speculation in the early modern period was about futures that, while often representing extensions of the present, also enabled speculating on the past, on eternity and *untime*. Going back into these histories of speculation, Susanne Lachenicht discovers in them a *speculum* for today's practices of speculation. The diverse timescapes of the early modern period can help us to critically assess our own times, our own temporal orientations and modes of speculation, and to recall alternative conceptions for other times not yet here.

## Modeling: Speculating with Data

Scientific speculation as we understand it today is rooted in numbers. Calculations, graphs, measurements, and quantified data feed the extrapolative thinking that yields predictive models in science and finance, as well as games both analog and digital. Exploring this field of speculation, the first section presents three case studies: one on the relationship between climate modeling in science and science fiction; one on manifestations of uncertainty in the model worlds of computer games; and one on the speculative affordances of 'lag' in high-frequency trading, online game economies, and other algorithmic recreations. All three contributions showcase approaches to speculation that play with calculated models. What they make clear is that models become tools of speculation through narrative and storytelling, above and beyond the raw calculus of quantifiable patterns.

Katherine Buse's "The Working Planetologist: Speculative Worlds and the Practice of Climate Science" examines journal articles, blog posts, textbooks, and lectures by climate scientists, uncovering a discourse around speculative fiction that not only refers to specific texts but also reflects upon the importance of science-fictional thinking for the technical work of modeling planetary systems.

Connecting the discursive and mathematical construction of worlds in climate modeling to the speculative fictions referenced by scientists, especially Frank Herbert's *Dune* (1965), the chapter characterizes a shared practice of climatological speculation in both science and fiction. The title of the chapter is adapted from Herbert's use of the phrase "the working planetologist" to describe *Dune*'s planetary ecologist, because this character enacts a kind of planetary consciousness that links science fiction with climate modeling. Climate scientists refer to science fiction pedagogically and methodologically to communicate the ideas of speculative climatology, suggesting that the comprehension of our own climate requires embedding it in a multiverse of imaginary otherworlds.

In "The Rule of Productivity and the Fear of Transgression: Speculative Uncertainty in Digital Games," Felix Raczkowski investigates how practices of speculation inscribe themselves into contemporary digital games while also arguing that games and play enable speculation through their inherent uncertainty. After a brief overview of the relationship between games, play, and uncertainty, the chapter analyzes two manifestations of uncertainty in digital games as well as the speculative strategies they foster in detail. On the one hand, ludic uncertainty serves the interest of game play in the context of online multiplayer games and simulations. On the other hand, uncertainty also appears as risk, and the fear of transgressive acts leads to various attempts to discipline the player base of online games. Raczkowski's chapter concludes that both productive and transgressive uncertainties are entrenched in speculative concerns about the future of digital games and games research.

Capitalist speculation dreams of reducing risks and obliterating waiting times, as the subsequent chapter reminds us. Yet it also depends on open futures and delays at both technical and social levels. In "Lagging Realities: Temporal Exploits and Mutant Speculations," Joseph Dumit studies shared speculative experiences of lag: what happens when lags are persistent, when they are encountered as things to which people must creatively adapt. How do they warp reality by warping time as lagged time—never lagged-time-in-general, but always specific forms of lag? Drawing on thick descriptions of financial speculation, first-person-shooter games, basketball, massively multiplayer online role-playing games, human simulation, and botting, the chapter follows where and how lag shows up, where it must be put into speech, and how it becomes a matter of concern, a material-semiotic actor that, once named into existence, has the potential to warp existence and time itself. Dumit's chapter finds that even as lag slows things down, it affords the potential for affirmative speculation, presenting unexpected opportunities and soliciting anticipatory practices that, by delaying a future, can produce new ways of speculating.

## Embodiment: Speculating with Matter

Looking at material speculative practices, including experimentation in the sciences, social research, and performance art, highlights the role of embodiment and pushes against an overly limited notion of speculation as abstraction. Our case studies here delve into scientific practices involving germfree organisms and mold growth, as well as performance practices for an embodied epistemology of “performance as research.” What these studies have in common is an interest in how speculation plays out in and through bodies—both human and nonhuman—and how materiality intersects with discourse, affects, and expectations in the formation of speculative alternatives to the known and the familiar.

Melissa Wills’s “‘La vie impossible’: Germfree Life in the Microbiome Era” shows how narratives of life without microbes are being rewritten in the wake of twenty-first-century research into the human microbiome. Germfree life, whether animal or human, was long considered to be a technical achievement. Born and maintained within complex sterile chambers, germfree organisms were viewed as perfections of engineering and of modern medicine: healthy, long-lived, and free of microbial disease, they seemed to herald a future of radiant health for all. In the microbiome era, that assessment has changed profoundly. Examining a corpus of ten popular microbiome books, Wills shows how contemporary pop-science writers are actively rewriting the legacy and status of germfree animal research. Through a series of historical and rhetorical distortions, she argues, germfree bodies become sick, victims of the impulse to eradicate microbes and suffering the loss of their accustomed symbionts. Made into representatives of a catastrophic future to come, these bodies function as speculative interventions in a looming crisis of antibiotic-laced modernity, invoked as deterrents to the persistent dream of life beyond germs.

Social relations to the nonhuman that include endeavors of countering projected human impairment of health are also at the focus of another essay, which starts out from the observation that the fungi called “mold” are usually seen as contamination when encountered in and on buildings or food. Christoph Schemann’s “Spores of Speculation: Negotiating Mold as Contamination” engages with some recurrent socio-material strategies through which such contamination is established and navigated, including the registers of visibility, ventilation, temporality, and disgust. Drawing on Karen Barad’s (2007) notion of the “apparatus,” the chapter shows that the activation of such processes of negotiation—as well as their alteration—can take shape only through specific practices of speculation. These include firmative practices that revolve around anticipated threats to human health and preemptive actions directed at securing an uncontaminated human future. Contrasting such a foreclosing mode of speculation with affirmative speculation, the essay goes on to examine practices such as urban exploration and dumpster

diving that speculate *with*, rather than solely *about*, mold. Schemann argues that such a contingent and unprompted mode of speculating opens up future possibilities for prolific yet uncertain engagements with more-than-human materialities. It may also assist, he suggests, in reframing the category of contamination as a more nuanced and polyphonic form of collaborative encounters.

The speculative dimensions of performative knowledge production are at the center of Wolf-Dieter Ernst and Jan Simon Hutta's chapter, "Enacting Speculation: The Paradoxical Epistemology of Performance as Research." The authors point out that the generation of knowledge, despite the focus on how bodily contingency can be held at bay in Western traditions of science, necessarily depends on embodied and performative practices. While the sociology of knowledge and the feminist discussion of situated knowledges have by now made this much sufficiently clear, the essay enquires into the generative potential that resides in not only acknowledging bodily, performative, and speculative dimensions but also intensifying them. Such intensification, they argue, fosters the generation of new knowledge as well as ways of knowing otherwise. To develop this argument, the chapter relates the question of speculation to the discussions about "performance as research" (Kershaw 2008, 2009; Stutz 2008). Drawing on an interdisciplinary seminar that they conducted in collaboration with Matt Adams from the arts collective Blast Theory, Ernst and Hutta highlight the productive role of paradoxical constellations of facticity and fictionality, embodied specificity and boundlessness, as well as scientific inscription and practical performance. Amplifying rather than reducing such paradoxicality, they argue, prompts performing researchers to develop creative responses to unfolding events, potentially instigating new knowledge as well as new ways of knowing.

## Figuration: Speculating with Fiction

As a word, a concept, figuration has traveled circuitous etymological routes, from its roots in the Latin *figura* to the German *Figur* and the English *figure*, to its usage in contemporary theoretical discourse. Two German-speaking scholars have been particularly influential in shaping the notion of figuration: the philologist Erich Auerbach and the sociologist Norbert Elias. Auerbach, in his 1938 essay "Figura," presents *figuration* as a way of reading the relationship between the Old Testament and the New Testament, in which the old prefigures and forecasts the new—a pattern of retroactive anticipation and prospective fulfillment that he traces across Western literature in his well-known book, *Mimesis* (Auerbach [1938] 2019; cf. Balke 2019). Similarly, Elias's concept of figuration in approaching society as a dynamic process—the basis of figurational sociology—suggests configurations, networks, or assemblages, influenced by the German word *Figur* (a character in a play) and

drawing upon the etymological sense of figure as plastic form (Elias [1975] 1994). It is in this sense that figuration also refers to tropes and figures of speech, in which one thing points to another—in other words, in borrowed form. In English, figure is also a verb and a noun that refers to shapes and numbers as well as drawings and graphical images. Figuration is fraught with protean meaning—a projection or forecast of meaning as such.

In this section, we take a cue from Donna Haraway, who theorizes figuration by drawing from a range of contexts, including Auerbach's *Mimesis*. Haraway writes, "Figurations are performative images that can be inhabited. Verbal or visual, figurations can be condensed maps of contestable worlds" (Haraway 1997: 11). Figuration emerges as a mode of speculation that, grounded in both the *figural* (referring to individuated figures and configurations) and the *figurative* (spanning the range of visual and verbal expressions), spins a web of interdependent figures. Figuration characterizes speculative practices that draw inferential, conjectural, and anticipatory connections between one thing (a shape, a number, an actor, a cipher) and another (an object, an entity, a world, or whatever).

As a method of make-believe, speculation often plays out in the form of fiction, that is, imaginary and invented stories. On one level, all fictional texts are speculative in this sense (Merril [1966] 1971; Freedman 2000). Speculative fiction, however, deliberately envisions sociopolitical, economic, and cultural consequences of scientific and technological change, as well as other knowledge-making and world-building practices, including those that may not be possible in our own universe. The chapters in this section of the book focus on speculative fiction in different media, exploring questions of space and scale, temporality, uncertainty, and self-referentiality.

In "Scale and Speculative Futures in Russell Hoban's *Riddley Walker* and Kim Stanley Robinson's *2312*," Matthew Hannah and Sylvia Mayer discuss two science fiction novels that engage with contemporary key technologies: Russell Hoban's *Riddley Walker* (1980), which speculates about possible effects of nuclear technology, and Kim Stanley Robinson's *2312* (2012), which speculates about possible consequences of computational, biomedical, and geoengineering technologies. Hannah and Mayer focus on the spatiality of the future worlds presented by these novels and demonstrate how "scale" as a narrative strategy draws attention to the relevance of spatial and scalar structuring in fictional future worlds—and, by implication, in nonfictional worlds, as well. The re-scaled future worlds of *Riddley Walker* and *2312* shed light on the dynamics of the social constitution of both space and time and on the potential hazards of technological modernization.

Drawing on queer theory and fan studies, Jordan Carroll's "The Lifecycle of Software Engineers: Geek Temporalities and Digital Labor" argues that geeks share a common experience of time. Both fans and tech workers seem to lose track of all other schedules when they become immersed in labor or leisure—which, for

geeks, blur together. While geeks have long been considered to be rebels or outsiders, geek temporalities actually prove to be more politically ambiguous. They allow tech workers to accommodate themselves to punishingly long hours, but they also push geeks to choose work and play over heterofamilial commitments, setting them at odds with temporal norms surrounding heterosexual maturity. Moreover, although geeks would seem to be ideal consumers, their excessive attachments to old media mean that they often resist capitalist narratives of progress. Geeks therefore frequently appear in fiction as archaic, childlike, or alien figures who are somehow out of synchronicity with normal people. Thus, geeks are often associated with characters in speculative fiction, including androids or artificial intelligences. They are capable of working like machines, but they operate on different timescales from most humans. Through a close reading of Ted Chiang's novella *The Lifecycle of Software Objects* (2010), this essay suggests that geek practices of speculation can present alternatives to chronormativity.

In "Uncertainty between Image and Text in Ben Templesmith's *Singularity 7*," Jeanne Cortiel and Christine Hanke focus on the relationship between images and text, and the ways in which the two work together in comics to create narrative. They point out that something more is also created in the interaction between the visual and the textual in comics—an effect perhaps best described as figuration. Seeing this interaction as figuration turns attention to speculation as integral to how comics engage in worldmaking beyond narrative. Based on a paradigmatic reading of a dystopian graphic novel, *Singularity 7* by Ben Templesmith (2004), the chapter attends to how comics as a medium speculate specifically in the tension between image and text, narrative and performance. Undertaking a dialogue between literary studies and media studies/image theory (*Bildwissenschaft*), Cortiel and Hanke explore the question of how the visual layers, box commentary and character speech work together (or across one another) to undermine the stabilizing tendencies of both story and visuals in comics. This interdisciplinary dialogue brings out the inherently paradoxical nature of speculation in comics and discusses how uncertainty shapes the interactions between image and text. *Singularity 7* is a comic that deliberately deploys the effects produced by the visuals and the ways in which images both propel and counteract the narrative flow. Images perform a medial presence by themselves that is in tension with the text layers. Addressing the questions raised by this highly self-referential comic, the authors investigate how *Singularity 7* specifically assembles images and text, but they also suggest how the uncertainty created in this performance of intermediality characterizes comics in general.

Approaching the speculative operations of comic books from another direction, Mark Jerng and Colin Milburn's chapter, "This World Which Is Not One: Superhero Comics and Other Dimensions of Reference," examines the practices of allusion, citation, and reference-making in superhero fictions. Noting that super-



hero comics always take place in an alternate reality from our own—and that the genre has cultivated the trope of the ‘multiverse’ or multiple universes to accommodate divergent, sometimes contradictory narratives—Jerng and Milburn show how references to historical events, works of art, or cultural clichés often seem to stabilize continuity and secure a consensus reality. Yet in superhero comics, such references also highlight discontinuities and perform a speculative ontology of difference, a worldview that affirms more worlds than one. The practices of reference in superhero comics reach out to occluded eras of the past, alternative histories of the present, and other worlds yet to come, assembling heterogeneous components through radical juxtapositions of image and text. But even at the moment of producing narrative cohesion and retroactive continuity—that is, at the moment of ‘retcon’—superhero comics register the irreducible multiplicity of worlds and alternative frames of reference. As Jerng and Milburn remind us, superhero comics have long been self-aware and self-reflexive about such issues, suggesting the capacities of speculative media to grapple with the firmative and affirmative forces at play in our world and others.

These collected studies of diverse anticipations, projections, alterities, counterfactuals, simulations, and virtualities—spectral visions brought to life through acts of modeling, embodiment, and figuration—are situated in a particular historic moment. It is an era of urgent anticipation—like many others before. We are now urged to shelter in place, to ride out the pandemic storm—but tomorrow is another day. As they say, there’s no time like the present. So, let us not dawdle any longer. We hereby release this book into an uncertain future, hoping that it will inspire reflections on past and future practices of speculation. Where things go from here, we can only imagine.

## Acknowledgements

Many thanks to Laura Rosinger for her tremendous help with the copyediting of this book, as well as to Uli Beisel, Joe Dumit, Wolf-Dieter Ernst, Matt Hannah, Michael Hauhs, Mark Jerng, Susanne Lachenicht, and Sylvia Mayer for their detailed comments on earlier drafts of the chapters. The research collaboration represented in this book was supported over many years with contributions from the Bayreuth Institute for American Studies (BIFAS), the Emerging Field Kulturbegegnungen und transkulturelle Prozesse at the University of Bayreuth, the International Fellowship Program of the University of Bayreuth, the Bayreuth Academy of Advanced African Studies, the German Research Foundation (DFG), the Fritz Thyssen Stiftung, and the ModLab at the University of California, Davis. Thanks also to Laura Oehme, Jordan Carroll, Amanda Phillips, Susanne Lachenicht, Matt Hannah, and Sylvia Mayer for their help supporting our collaborative research in



Bayreuth and Davis from 2010–2020. We are grateful for the warm and inspiring space for speculation provided by the “Cultures of Speculation” group across the Atlantic and across disciplines.

## References

- Appadurai, Arjun (2013): *The Future as Cultural Fact: Essays on the Global Condition*. New York: Verso.
- Auerbach, Erich ([1938] 2019): “Figura.” In: Friedrich Balke/ Hanna Engelmeier (eds.): *Mimesis und Figura: Mit einer Neuausgabe des “Figura”-Aufsatzes von Erich Auerbach*. Paderborn: Wilhelm Fink, 121–188.
- Bahng, Aimee (2018): *Migrant Futures: Decolonizing Speculation in Financial Times*. Durham, NC: Duke University Press.
- Balke, Friedrich (2019): “Mimesis und Figura: Erich Auerbachs niederer Materialismus.” In Friedrich Balke/Hanna Engelmeier (eds.): *Mimesis und Figura: Mit einer Neuausgabe des “Figura”-Aufsatzes von Erich Auerbach*. Paderborn: Wilhelm Fink, 13–88.
- Barad, Karen (2007): *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.
- Bauer, Susanne/Olsén, Jan (2009): “Observing the Others, Watching Oneself: Themes of Medical Surveillance in Society.” In: *Surveillance and Society* 6, 116–127.
- Bear, Laura/Birla, Ritu/Puri, Stine Simonsen (eds.) (2015): *Speculation: Futures and Capitalism in India* [special section]. In: *Comparative Studies of South Asia, Africa and the Middle East* 35, 387–485.
- Bear, Laura (ed.) (2020): *Speculation: A Political Economy of Technologies of Imagination* [special issue]. In: *Economy and Society* 49, 1–186.
- Beck, Ulrich ([1986] 1992): *Risk Society: Towards a New Modernity*. Mark Ritter (trans.). London: Sage.
- Beckert, Jens (2016): *Imagined Futures: Fictional Expectations and Capitalist Dynamics*. Cambridge, MA: Harvard University Press.
- Beisel, Uli/Boëte, Christophe (2013): “The Flying Public Health Tool: Genetically Modified Mosquitoes and Malaria Control.” In: *Science as Culture* 22, 38–60.
- Bryant, Levy/Srnicke, Nick/Harman, Graham (eds.) (2011): *The Speculative Turn: Continental Materialism and Realism*. Melbourne: re.press.
- Callon, Michel (ed.) (1998): *The Laws of the Market*. Oxford: Blackwell.
- Carroll, Hamilton/McClanahan, Annie (eds.) (2015): *Fictions of Speculation* [special issue]. In: *Journal of American Studies* 49: 655–859.
- Chandler, Clare I. R./Beisel, Uli (2017): “The Anthropology of Malaria: Locating the Social.” In: *Medical Anthropology* 36, 411–421.

- Chang, Alenda Y. (2019): *Playing Nature: Ecology in Video Games*. Minneapolis: University of Minnesota Press.
- Chua, Liana/Fair, Hannah (2019): "Anthropocene." In: Felix Stein/Sian Lazar/Matei Candea/Hildegard Diemberger/Joel Robbins/Andrew Sanchez/Rupert Stasch (eds.): *The Cambridge Encyclopedia of Anthropology* (<https://www.anthroencyclopedia.com/entry/anthropocene>).
- Clarke, Bruce (2008): *Posthuman Metamorphosis: Narrative and Systems*. Fordham University Press.
- Cooper, Melinda (2008): *Life as Surplus: Biotechnology and Capitalism in the Neoliberal Era*. Seattle: University of Washington Press.
- Cortiel, Jeanne (1999): *Demand My Writing: Joanna Russ/Feminism/Science Fiction*. Liverpool: Liverpool University Press.
- Csicsery-Ronay, Istvan, Jr. (2008): *The Seven Beauties of Science Fiction*. Middletown, CT: Wesleyan University Press.
- Daston, Lorraine (1988): *Classical Probability in the Enlightenment*. Princeton, NJ: Princeton University Press.
- Daston, Lorraine/Galison, Peter (2007): *Objectivity*. Cambridge, MA: MIT Press.
- Davis, Heather/Turpin, Etienne (eds.) (2015): *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*. London: Open Humanities Press.
- Deleuze, Gilles/Guattari, Félix ([1980] 2003): *A Thousand Plateaus: Capitalism and Schizophrenia*. Brian Massumi (trans.). London: Continuum.
- Desrosières, Alain ([1993] 1998): *The Politics of Large Numbers: A History of Statistical Reasoning*. Cambridge, MA: Harvard University Press.
- Diez, Georg/Heisenberg, Emanuel (2020): *Power to the People: Wie wir mit Technologie die Demokratie neu erfinden*. Berlin: Hanser.
- Doyle, Richard (2003): *Wetwares: Experiments in Postvital Living*. Minneapolis: University of Minnesota Press.
- Dumit, Joseph (2012): *Drugs for Life: How Pharmaceutical Companies Define Our Health*. Durham, NC: Duke University Press.
- Elias, Norbert ([1975] 1994): "Introduction: A Theoretical Essay on Established and Outsider Relations." In: Norbert Elias/John L. Scotson: *The Established and the Outsiders: A Sociological Enquiry into Community Problems*. Second ed. London: Sage, xv–lii.
- Fisher, William F./Ponniah, Thomas (eds.) (2003): *Another World Is Possible: Popular Alternatives to Globalization at the World Social Forum*. London: Zed Books.
- Fortun, Michael (2008): *Promising Genomics: Iceland and deCODE Genetics in a World of Speculation*. Berkeley: University of California Press.
- Franklin, H. Bruce ([1988] 2008): *War Stars: The Superweapon and the American Imagination*. Rev. and expanded ed. Amherst, MA: University of Massachusetts Press.

- Freedman, Carl (2000): *Science Fiction and Critical Theory*. Hanover, NH: Wesleyan University Press.
- Ghosh, Bishnupriya/Sarkar, Bhaskar (eds.) (2020): *The Routledge Companion to Media and Risk*. London: Routledge.
- Hacking, Ian (1990): *The Taming of Chance*. Cambridge: Cambridge University Press.
- Hanke, Christine (2007): *Zwischen Auflösung und Fixierung: Zur Konstitution von 'Rasse' und 'Geschlecht' in der physischen Anthropologie um 1900*. Bielefeld: transcript.
- Hanke, Christine (2014): "Alles nur Programm? Überlegungen zum Unprogrammierten der Medien(wissenschaft)." In: Dieter Mersch/Joachim Paech (eds.): *Programm(e): Medienwissenschaftliche Symposien der DFG*. Berlin: Diaphanes, 269–297.
- Hannah, Matthew G. (2010): *Dark Territory in the Information Age: Learning from the West German Census Controversies of the 1980s*. Farnham: Ashgate.
- Hannah, Matthew G./Hutta, Jan Simon/Schemann, Christoph (2020): "Thinking through Covid-19 Responses with Foucault: An Initial Overview." *Antipode Online*, May 5 (<https://antipodeonline.org/2020/05/05/thinking-through-covid-19-responses-with-foucault/>).
- Haraway, Donna J. (1988): "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." In: *Feminist Studies* 14, 575–599.
- Haraway, Donna J. (1997): *Modest\_Witness@Second\_Millennium.FemaleMan®\_Meets\_OncoMouse™: Feminism and Technoscience*. New York: Routledge.
- Haraway, Donna J. (2016): *Staying with the Trouble: Making Kin in the Chthulucene*. Durham, NC: Duke University Press.
- Hayles, N Katherine (1999): *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: University of Chicago Press.
- Higgins, David M./O'Connell, Hugh C. (eds.) (2019): *Speculative Finance/Speculative Fiction* [special issue]. In: *CR: The New Centennial Review* 19, 1–301.
- Indigenous Action (2020): "Rethinking the Apocalypse. An Indigenous Anti-Futurist Manifesto," March 19 (<http://www.indigenousaction.org/rethinking-the-apocalypse-an-indigenous-anti-futurist-manifesto/>).
- Jameson, Fredric (2005): *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*. London: Verso.
- Jerng, Mark C. (2018): *Racial Worldmaking: The Power of Popular Fiction*. New York: Fordham University Press.
- Jordan, Silvia /Mitterhofer, Hermann/Jørgensen, Lene (2018): "The Interdiscursive Appeal of Risk Matrices: Collective Symbols, Flexibility Normalism and the Interplay of 'Risk' and 'Uncertainty'." In: *Accounting, Organizations and Society* 67, 34–55.

- Jordheim, Helge/Lie, Anne Kveim/Ljungberg, Erik/Wigen, Einar (2020): "Epidemic Times." In: *Somatosphere*, April 2, <http://somatosphere.net/2020/epidemic-times.html/>.
- Jue, Melody (2020): *Wild Blue Media: Thinking through Seawater*. Durham, NC: Duke University Press.
- Juris, Jeffrey S. (2008): *Networking Futures: The Movements against Corporate Globalization*. Durham, NC: Duke University Press.
- Kershaw, Baz (2008): "Performance as Research: Live Events and Documents." In: Tracy C. Davis (ed.): *The Cambridge Companion to Performance Studies*. Cambridge: Cambridge University Press, 23–45.
- Kershaw, Baz (2009): "Performance Practice as Research: Perspectives from a Small Island." In: Shannon Rose Riley/Lynette Hunter (eds.): *Mapping Landscapes for Performance as Research: Scholarly Acts and Creative Cartographies*. London: Palgrave Macmillan, 3–13.
- Kilgore, De Witt Douglas (2003): *Astrofuturism: Science, Race, and Visions of Utopia in Space*. Philadelphia: University of Pennsylvania Press.
- Knorr Cetina, Karin/Preda, Alex (eds.) (2005): *The Sociology of Financial Markets*. Oxford: Oxford University Press.
- Landon, Brooks (2014): "Extrapolation and Speculation." In: Rob Latham (Ed.): *The Oxford Handbook of Science Fiction*. Oxford: Oxford University Press, 23–34.
- Levitas, Ruth (2013): *Utopia as Method: The Imaginary Reconstitution of Society*. Houndmills: Palgrave Macmillan.
- Link, Jürgen (1996): *Versuch über den Normalismus: Wie Normalität produziert wird*. Opladen: Westfälisches Dampfboot.
- Link, Jürgen (2004a): "From the 'Power of the Norm' to 'Flexible Normalism': Considerations after Foucault." Mirko M. Hall (trans.). In: *Cultural Critique* 57, 14–32.
- Link, Jürgen (2004b): "On the Contribution of Normalism to Modernity and Postmodernity." Mirko M. Hall (trans.). In: *Cultural Critique* 57, 33–46.
- Link, Jürgen (2004c): "The Normalistic Subject and Its Curves: On the Symbolic Visualization of Orienteering Data." Mirko M. Hall (trans.). In: *Cultural Critique* 57, 47–67.
- Link, Jürgen (2004d): "On the Temporal Quality of the Normalistic 'Fun and Thrill' Tape." Mirko M. Hall (trans.). In: *Cultural Critique* 57, 68–90.
- LiPuma, Edward/Lee, Benjamin (2004): *Financial Derivatives and the Globalization of Risk*. Durham, NC: Duke University Press.
- Lütz, Susanne (2017): "Finanzmärkte." In: Andreas Maurer (ed.): *Handbuch der Wirtschaftssoziologie*. Second ed. Wiesbaden: Springer, 385–413.
- Maeße, Jens/Sparsam, Jan (2017): "Die Performativität der Wirtschaftswissenschaft." In: Andreas Maurer (ed.): *Handbuch der Wirtschaftssoziologie*. Second ed. Wiesbaden: Springer, 181–195.

- Mavhunga, Clapperton Chakanetsa (2018): *The Mobile Workshop: The Tsetse Fly and African Knowledge Production*. Cambridge, MA: MIT Press.
- Mayer, Ruth/Weingart, Brigitte (eds.) (2004): *Virus! Mutationen einer Metapher*. Bielefeld: transcript.
- Mayer, Sylvia/Weik von Mossner, Alexa (eds.) (2014): *The Anticipation of Catastrophe: Environmental Risk in North American Literature and Culture*. Heidelberg: Universitätsverlag Winter.
- McNally, David ([2002] 2006): *Another World Is Possible: Globalization and Anti-Capitalism*. Rev. expanded ed. Winnipeg: Arbeiter Ring.
- Merchant, Briant (2020): "Coronavirus Is Speeding Up the Amazonification of the Planet." In: *OneZero*, March 19 (<https://onezero.medium.com/coronavirus-is-speeding-up-the-amazonification-of-the-planet-21cb20d16372>).
- Merril, Judith ([1966] 2017): "What Do You Mean: Science? Fiction?" In: Rob Latham (ed.): *Science Fiction Criticism: An Anthology of Essential Writings*. London: Bloomsbury, 22–36.
- Meyer, Emilio P.N./Bustamante, Thomas (2020): "Authoritarianism Without Emergency Powers: Brazil Under COVID-19." In: *Verfassungsblog on Matters Constitutional*, April 8 (<https://verfassungsblog.de/authoritarianism-without-emergency-powers-brazil-under-covid-19>).
- Mignolo, Walter (2011): *The Darker Side of Western Modernity: Global Futures, Decolonial Options*. Durham, NC: Duke University Press.
- Milburn, Colin (2008): *Nanovision: Engineering the Future*. Durham, NC: Duke University Press.
- Milburn, Colin (2015): *Mundo Nano: Fun and Games in the World of Digital Matter*. Durham, NC: Duke University Press.
- Milburn, Colin (2018): *Respawn: Gamers, Hackers, and Technogenic Life*. Durham, NC: Duke University Press.
- Milburn, Colin (2020): "The Future at Stake: Modes of Speculation in *The Highest Frontier* and *Microbiology: An Evolving Science*." In: Bruce Clarke (ed.): *Posthuman Biopolitics: The Science Fiction of Joan Slonczewski*. Cham: Palgrave Macmillan, 133–160.
- Mitchell, Timothy (2002): *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley: University of California Press.
- Nobre, Marcos (2019): "O Caos Como Método." In: *Piauí*, no. 151, April (<https://piaui.folha.uol.com.br/materia/o-caos-como-metodo/>).
- Otto, Eric C (2012): *Green Speculations: Science Fiction and Transformative Environmentalism*. Columbus: Ohio State University Press.
- Patel, Geeta (2017): *Risky Bodies and Techno-Intimacy: Reflections on Sexuality, Media, Science, Finance*. Seattle: University of Washington Press.
- Penley, Constance (1997): *NASA/Trek: Popular Science and Sex in America*. London: Verso.

- Peterson, Kristin (2014): *Speculative Markets: Drug Circuits and Derivative Life in Nigeria*. Durham, NC: Duke University Press.
- Porter, Theodore M. (1986): *The Rise of Statistical Thinking, 1820–1900*. Princeton, NJ: Princeton University Press.
- Preda, Alex (2005): “The Investor as a Cultural Figure of Global Capitalism.” In: Karin Knorr Cetina/Alex Preda (eds.): *The Sociology of Financial Markets*. Oxford: Oxford University Press, 141–162.
- Rees, Amanda/Morus, Iwan Rhys (eds.) (2019): *Presenting Futures Past: Science Fiction and the History of Science* [special issue]. In: *Osiris* 34.
- Russ, Joanna (1972): “The Image of Women in Science Fiction.” In: Rob Latham (ed.): *Science Fiction Criticism: An Anthology of Essential Writings*. London: Bloomsbury, 200–210.
- Saler, Michael (2012): *As If: Modern Enchantment and the Literary Prehistory of Virtual Reality*. Oxford: Oxford University Press.
- Sargent, Lyman Tower (2010): *Utopianism: A Very Short Introduction*. Oxford: Oxford University Press.
- Servitje, Lorenzo/Vint, Sherryl (eds.): *The Walking Med: Zombies and the Medical Image*. University Park, PA: Penn State University Press, 2016.
- Sharp, Patrick B. (2018): *Darwinian Feminism and Early Science Fiction: Angels, Amazons, and Women*. Cardiff: University of Wales Press.
- Squier, Susan Merrill. (2004): *Liminal Lives: Imagining the Human at the Frontiers of Biomedicine*. Durham, NC: Duke University Press.
- Stäheli, Urs (2013 [2007]): *Spectacular Speculation: Thrills, the Economy, and Popular Discourse*. Eric Savoth (trans.). Stanford, CA: Stanford University Press.
- Strick, Simon (2020): “Digitally Drunk.” In: *Zeitschrift für Medienwissenschaft: Gender-Blog*, March 28 (<https://www.zfmedienwissenschaft.de/online/blog/digitally-drunk>).
- Streeby, Shelley (2018): *Imagining the Future of Climate Change: World-Making through Science Fiction and Activism*. Berkeley: University of California Press.
- Stutz, Ulrike (2008): “Performative Forschung in der Kunstpädagogik am Beispiel von Szenen aus dem Seminar ‘Erforschen performativer Rituale im Stadtraum.’” In: *Forum: Qualitative Social Research* 9(2) (<http://dx.doi.org/10.17169/fqs-9.2.411>).
- Sunder Rajan, Kaushik (2006): *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke University Press.
- Tilley, Helen (2011): *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950*. Chicago: Chicago University Press.
- Treichler, Paula (1989): “AIDS, Homophobia, and Biomedical Discourse: An Epidemic of Signification.” In: Douglas Crimp (ed.): *AIDS: Cultural Analysis/Cultural Activism*, Cambridge, MA: MIT Press, 31–70.

- Turney, Jon (1998): *Frankenstein's Footsteps: Science, Genetics and Popular Culture*. New Haven: Yale University Press.
- uncertain commons (2013): *Speculate This!* Durham, NC: Duke University Press
- Vint, Sherryl (ed.) (2015): *The Futures Industry* [special issue]. In: *Paradoxa* 27, 7–282.
- Wald, Priscilla (2008): *Contagious: Cultures, Carriers, and the Outbreak Narrative*. Durham, NC: Duke University Press.
- Waldby, Cathy/Mitchell, Robert (2006): *Tissue Economies: Blood, Organs, and Cell Lines in Late Capitalism*. Durham, NC: Duke University Press.
- Wilkie, Alex/Savransky, Martin/Rosengarten, Marsha (eds.) (2017): *Speculative Research: The Lure of Possible Futures*. London: Routledge.
- Willis, Martin (2006): *Mesmerists, Monsters, and Machines: Science Fiction and the Cultures of Science in the Nineteenth Century*. Kent, OH: Kent State University Press.
- Zaloom, Caitlin (2004): “Productive Life of Risk.” In: *Cultural Anthropology* 19, 365–391.
- Zaloom, Caitlin (2005) “The Discipline of Speculators.” In: Aihwa Ong/Stephen J. Collier (eds.): *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*. Malden, MA: Blackwell, 253–269.

