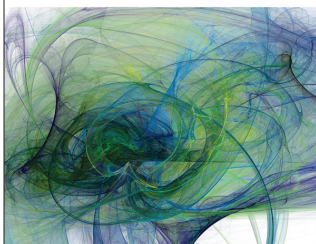


**CREATIVITY AND SCIENCE
IN CONTEMPORARY ARGENTINE LITERATURE**

Between Romanticism and Formalism



Joanna Page

CREATIVITY AND SCIENCE IN CONTEMPORARY ARGENTINE LITERATURE: BETWEEN ROMANTICISM AND FORMALISM

Joanna Page

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Joanna Page

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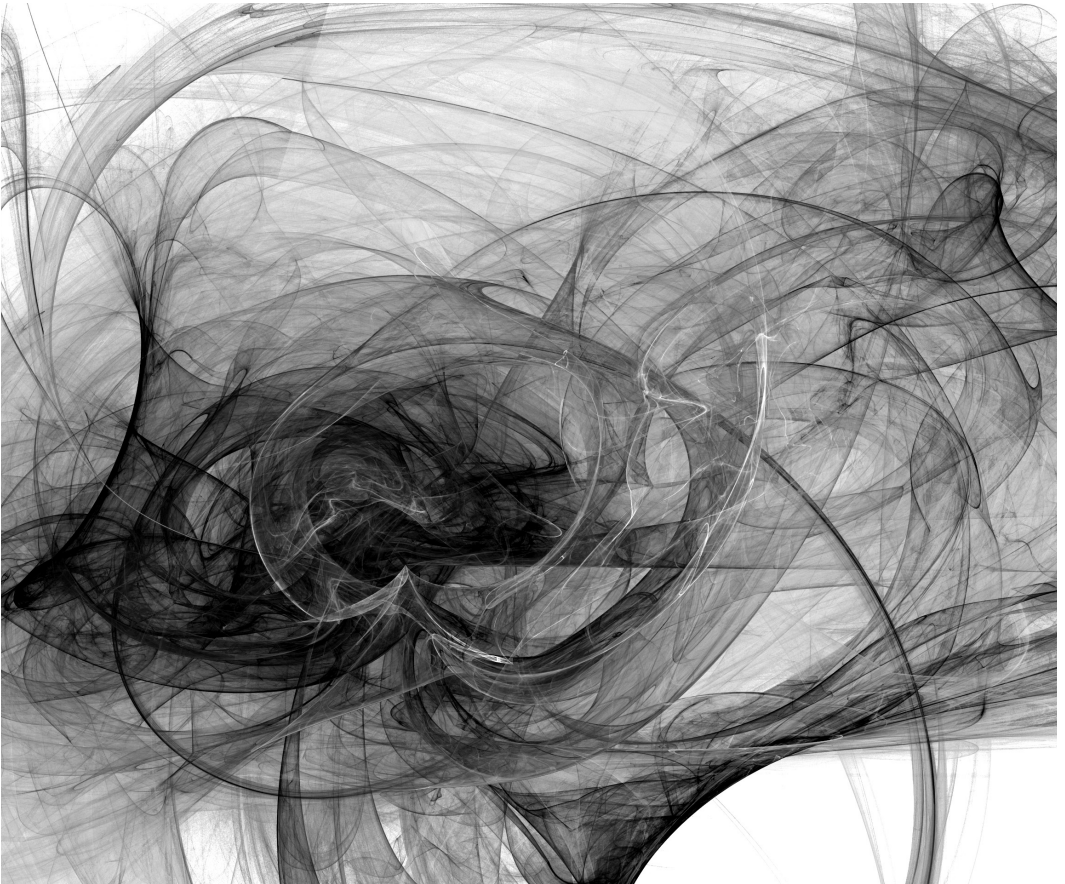
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Between Romanticism and Formalism



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Latin American and Caribbean Series
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To my father, who opened up the world to me

What is required [...] is to stop courageously at the surface,
the fold, the skin, to adore appearance, to believe in forms,
tones, words, in the whole Olympus of appearance.

—Friedrich Nietzsche

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or (worse) parasitical, I suspect I will have avoided neither fault in their view. But their texts have done nothing less than open my eyes to an enthralling vision of the continually self-renewing and self-transforming capacity of literature, and its role in an endlessly creative universe. This book is an expression of a new faith, and of my desire to participate in that creativity: by extending these wonderfully rich fictions to new readers and new contexts, and by amplifying and broadening their resonance through new syntheses.

Introduction: Countering Postmodern Apocalypticism

In British and North American literature since the 1960s, models and theories from mathematics and science – incompleteness, uncertainty, entropy, chaos, and complexity – have most often been put to use in forging apocalyptic visions of social and cultural decay or of an incomprehensible universe that lies beyond the limits of our science. These theories seem to speak to a postmodern skepticism concerning any genuine advance in knowledge and, at the same time, any possibility of artistic regeneration. They have lent force to the postmodern sense of an ending, or impasse, bringing to a halt the drive of modernist progress towards greater knowledge, freedom, and creativity. This is the vision assembled in the fiction of Thomas Pynchon and J. G. Ballard, for example, in which the uncertainty principle renders futile all human efforts to understand the unhomely universe in which we are trapped, and the thermodynamic process of entropy seems to command an inexorable decline in every area of psychological, social, and cultural experience.

Against the grain of much anglophone literature since the 1960s, and the skepticism of many postmodern theorists, recent Argentine fiction does not call upon theories of chaos, entropy, and uncertainty to bolster proclamations of the futility of all epistemological and artistic enterprises. In the work of the three contemporary Argentine writers chosen for this study, Marcelo Cohen, Guillermo Martínez, and Ricardo Piglia, models and

theories from mathematics and science are put to a very different use: to defend intellectual activity and to testify to the endless capacity of literature for self-renewal. The relationship these authors construct between chaos, complexity, and uncertainty, on the one hand, and literary creativity and evolution, on the other, allows them to counter postmodern claims of the exhaustion of artistic innovation. In different ways, their work mounts a vigorous challenge to the more apocalyptic strains of postmodernism that proclaim the end of epistemology and consign artistic creativity to mere bricolage, parody, or the endless production of simulacra. Instead, the visions that emerge are ones of anticipation, of new forms and new subjectivities to be shaped through a literature that does not merely survive crisis but thrives upon it. It is this book's contention that focussing on how mathematical and scientific theories are appropriated in these texts affords us greater insight into key tensions within postmodern thought, many of which demonstrate the contradictory persistence of both Romantic and Formalist conceptions of how newness enters the world.

ROMANTIC-POSTMODERN NOTIONS OF SCIENCE

Romanticism, in Hans Eichner's definition, is "perhaps predominantly, a desperate rearguard action against the spirit and the implications of modern science."¹ As a counter-movement to Enlightenment thought, Romanticism rejected the mechanistic models of the universe advanced by Newton and others in favour of more organic ones. Under attack were the Enlightenment beliefs that the universe could be reduced to a series of mechanical principles determining the function of any one part. Nature, the Romantics insisted, was not something to be dissected by Man as a superior observer of its forms; instead, greater knowledge – both physical and spiritual – of the universe would emerge through a dual contemplation of Nature and Man's role within it: not above it but co-existing harmoniously as part of it. Romantic *Naturphilosophie*, first emerging from work by Friedrich Schelling in the last few years of the eighteenth century, propounded an organicist view of the

universe and advocated the re-uniting of Man with Nature as the foundation of true scientific enquiry.

The theories of Schelling and his contemporaries, immensely influential on the science of their time (particularly in the new field of biology), did not survive the positivist turn to empirical evidence in nineteenth-century science. Their influence on cultural values and discourses, on the other hand, has endured through to the present. Indeed, the “Science Wars” of the 1990s have provided ample evidence of the continuing legacy of Romantic ideas of science within postmodern thought.

The infamous Sokal Affair of 1996 was ignited by the publication of a spoof essay in a major cultural studies journal in the United States, proposing that quantum gravity should be understood as a linguistic and social construct.² That the editors of *Social Text* did not grasp that the essay was designed to parody the wildly metaphorical and imprecise use of science in postmodern theory was taken as further evidence of postmodern sloppiness. The hoax stirred up an unholy mud-slinging match in which both sides have, for the greater part, remained steadfastly committed to their ignorance of the other and their determination to reduce the diversity of views on each side to a single (outdated or inaccurate) one. The rhetoric had already been on the rise in the early nineties: in their book *Higher Superstition: The Academic Left and Its Quarrels with Science* (1994), Paul R. Gross and Norman Levitt claimed that the “moral blankness” of postmodern skepticism is akin to that which gave rise to fascism in the first half of the twentieth century.³ They deride postmodernism’s belief in its own “omnicompetence” to pronounce “with supreme confidence on all aspects of human history, politics, and culture”⁴ and seek to discredit cultural theorists and social scientists who have dared to comment on science. Derrida, Foucault, Baudrillard, Lyotard, and their “clones” come in for unwavering censure. Gross and Levitt have, in turn, been accused of crude caricatures and ignorance of the positions they attack. Steven Best and Douglas Kellner devote several pages of their *The Postmodern Turn* (1997) to a detailed exposition of their claim that Gross and Levitt are guilty of precisely the same “deadly theoretical sins,” blatant misreadings, and half-baked argumentation that the latter charge to critical theorists.⁵

Although intransigence and misunderstanding have characterized the positions of both postmodernists and scientists in these debates, the responses of postmodern theorists often reveal the extent to which they are operating with an outdated model of science. As if locked into replaying an earlier struggle between Enlightenment and Romantic approaches to science, postmodernists have often confused science with positivism and mechanistic rationalism, accusing scientists of adhering to naive notions of objective truth. Taking up the Romantic sword, theorists of the postmodern often go out to do battle against the champions of Newtonian absolutes without realizing that their adversaries have long since decamped. Scientists, for their part, have caricatured postmodernists as trapped in an idealism that cannot accept the existence of anything beyond language. Thus, in the view of many cultural theorists in the humanities, as Ira Livingston suggests, “science naively mistakes the thinly veiled projection of its own ideologies for universal and unmediated truth”;⁶ at the other pole, meanwhile, “scientists tend to think that their cultural critics mistake the world for language,” turning material nature into “a frictionless fiction.”⁷

For many commentators, the “Science Wars” of the mid-1990s were proof of the intransigence of the ever-widening gap that C. P. Snow famously found in 1959 to divide the “two cultures” of the sciences and the humanities.⁸ Indeed, that gap is evident, not only in postmodernists’ rejection of science as an obsolete remnant of positivism dating back to the Enlightenment, but also in their over-enthusiastic embrace of the “new science” of uncertainty and chaos theory. A number of thinkers have certainly demonstrated a belief in the “omnicompetence” of postmodernism by insisting that there are now no longer two cultures but one, as science has finally come round to postmodernism’s own view on truth as inaccessible or constructed by the human observer. Best and Kellner even attempt to subsume recent scientific directions within “an *emerging postmodern paradigm*” and claim that, at the very least, we are witnessing “the construction of a new transdisciplinary paradigm.”⁹ This is evidenced by the coming-to-prominence of “a family of concepts” that “abandon mechanical and deterministic schemes in favor of new principles of chaos, contingency, spontaneity, and organism.”¹⁰

It is clear that certain notions of contingency, the complex interaction between order and disorder in physical and biological systems, and the inseparability of the observing subject from the object of observation have shaped both scientific and artistic practice since the early twentieth century and into the twenty-first. It is not a question, however, of science belatedly acknowledging what (post)modernists always knew to be true about the universe. Postmodernists' celebration of the triumph of the "good new" science of chaos and complexity over the "bad old" science of Newtonian absolutes demonstrates a good deal of misunderstanding. Both "old" and "new" sciences have emerged from the rigorous, dialectical tradition of scientific methodology, and chaos theory does not prove the superiority of subjective intuition over objective measurement. What is often called "chaos theory," we should remember, embraces attempts to account for two different phenomena: firstly, the surprising presence of order within apparently disordered systems, and secondly, the capacity of disorder to stimulate the creation of new kinds of order. As Alan Sokal and Jean Bricmont point out, "chaos" is a misnomer; they accuse Baudrillard, Deleuze, and Guattari in particular of using the term as synonymous for "disorder," while an accurate definition would be "sensitive dependence on initial conditions."¹¹

As N. Katherine Hayles puts it, "the science of chaos is not opposed to normal science. It *is* normal science."¹² Best and Kellner do acknowledge that "the older views of reality are not necessarily demolished" in scientists' attempt to account for a range of phenomena, including "reversibility and irreversibility, chance and necessity, dynamics and thermodynamics, entropy and evolution, natural selection and self-organization."¹³ It is, of course, the case that science now explores probabilistic and statistical truths as well as the certainties of classical Newtonian mechanics, but one approach has not replaced the other: as scientists often feel the need to point out, Newton's law of universal gravitation still pertains in the majority of cases, and no theory of relativity or quantum mechanics will stop an apple falling on your head. In sketching out the "family of concepts" that link postmodernism to contemporary science, Best and Kellner move too quickly from the recent interest in stochastic systems rather than deterministic ones, or forms of statistical rather than absolute truth, to state that what they call "postmodern

science”¹⁴ seeks to “challenge all beliefs in foundations, absolutes, truth, and objectivity, often to embrace a radical skepticism, relativism, and nihilism.”¹⁵

However grievously inaccurate, the correlation between the scenario of chaos and unpredictability, on the one hand, and epistemological failure, on the other, is continually reinforced in postmodern theory and literature. “Chaos” has become a particularly prevalent metaphor across the arts and social sciences: its wildfire spread signals, as John A. McCarthy acknowledges, “a growing sense that we have discovered a new tool for mapping our image of reality.”¹⁶ However, this new tool is often misused and regularly maps an image of reality that is not new at all but a rearticulation of Romantic views of science. We find ourselves still very much enmeshed in a Romantic set of oppositions between the subjective, the sublime, the experienced, the inner and the spiritual, on the one hand, and the objective, the measurable, the abstract, the visible, and the material, on the other. Paul Hamilton recognizes the stubborn presence of this framework when he reflects that “Sublimity, then, is deconstructed by Postmodernism into indeterminacy.”¹⁷

For Lance Schachterle, “One sign of the inadequacy of C. P. Snow’s thesis of ‘The Two Cultures’ is how frequently present-day writers turn to contemporary physics for underlying metaphors.”¹⁸ However, it is precisely the metaphorical use of scientific ideas that has irritated scientists most in postmodernism’s fascination for theories of incompleteness, uncertainty, chaos, and complexity. Nowhere is this more evident than in the frequent references to the work of Kurt Gödel in postmodern literature and theory. Published in 1931, Gödel’s incompleteness theorems demonstrate the limitations of axiomatic reasoning in proving mathematical truth. The first theorem maintains that every formal system will contain statements that cannot be proved or refuted, while the second goes further to state that no formal system can prove its own consistency. These theorems have frequently been wrenched from their context for use in other fields – by Régis Debray in sociology, for example – or simply to denote the failure of logic *tout court*. Whether the ungrounded use of such theorems in postmodern theory and the social sciences is denounced bitterly as a misapplication or welcomed as evidence of “creative misprision,” in Gillian Beer’s more receptive phrase,¹⁹ depends largely, of course, on which side of the disciplinary

divide one is situated. The impressionistic use of Gödel's theorems by theorists such as Kristeva, Irigaray, Lacan, Latour, Debray, Baudrillard, Deleuze, and Virilio has been catalogued in extensive and rancorous detail in a series of books published following the Sokal Affair, including Alan Sokal and Jean Bricmont's *Intellectual Impostures* (1998) and Jacques Bouveresse's *Prodiges et vertiges de l'analogie* (1999). The Argentine writer and erstwhile mathematician Guillermo Martínez has also entered the fray – see his *Gödel para todos* (2009), co-written with Gustavo Piñeiro – to add his voice to those scientists objecting to the use of Gödel's theorem as an analogy for an ever-increasing array of linguistic and sociological phenomena. On what basis, Martínez asks, should a very specific theory – on the incompleteness of formal systems – be chosen as an analogy, rather than the many other mathematical theories that *do* allow for axiomatic completeness?²⁰

Where Gödel is referenced in postmodern theory and literature, he is often credited with the complete demolition of the foundations of mathematical thought. Incautious theorists have declared that “el Teorema de Gödel representa un límite absoluto para el pensamiento lógico, o un golpe mortal a la razón clásica, o el fin de la certidumbre en el terreno de la matemática, etcétera” (Gödel's theorem represents an absolute limit to logical thought, or a fatal blow to classical reason, or the end of certainty in the field of mathematics, et cetera).²¹ As Martínez insists, in company with many mathematicians, Gödel's theorems do not invalidate any existing mathematical findings but simply demonstrate the limitations of a specific method.²² The eager incorporation of Gödel's theorems as metaphors in so many literary, analytical, and theoretical texts bears witness to the chasm of understanding that continues to separate the humanities from the sciences. This divide is also evident in critical responses to such uses: the policing of disciplinary borders clearly demarcates different categories for artistic imagination and a metaphorical use of language, on the one side, and for scientific reason, on the other.

ROMANTIC-POSTMODERN NOTIONS OF ARTISTIC CREATIVITY

If the view of science held by many theorists of the postmodern is largely inherited from Romanticism, so, it would appear, is their understanding of creativity. The spectre of the divinely inspired Romantic genius haunts the present, a constant reminder of that spirit of genuine originality and creativity that we presume to have abandoned contemporary art. Postmodern techniques of collage, sampling, or other arts of revitalizing the past or constructing surprising connections between different fields are somehow always taken to be “less than” real originality, or “all that’s left” when everything has already been said and done. As Zygmunt Bauman suggests, “The postmodern mind seems to condemn everything, propose nothing,”²³ erasing in its skepticism all hope of authentic creativity. By the 1960s, the notion that artistic innovation was no longer possible was widespread; a sense of coming to an end dominated cultural and critical discourse. The only thing now left for the postmodern artist to do, as Best and Kellner suggest, is “to play with the pieces of the past and to reassemble them in different forms.”²⁴ The artist, no longer the unique, expressive self of Romantic literature, has become “a *bricoleur* who just rearranges the debris of the cultural past.”²⁵

In the inaugural issue of the online journal *Rhizomes*, editors Ellen E. Berry and Carol Siegel venture to account in some ways for this overwhelming “postmodern sense of an ending, of living after the future or suspended in a perpetual present.”²⁶ They cite the widespread nature of the challenges mounted by postmodernism to Western rationalism and universalism, challenges that are “impossible to ignore if not utterly devastating”; in part, they maintain, “these critiques have emerged from a recognition that some of the bloodiest carnage of the 20th C was carried out in the name of bringing newness into the world.” Utopian thinking is now indissolubly wedded to a series of catastrophic events. For Berry and Siegel, this suspicion concerning the possibility of radical change is reinforced by the commodification of newness by postmodern consumer culture, which substitutes an unprecedented

proliferation of consumer choice – “a repetition of the idea of newness” – for genuine innovation.

This ennui, translated into fiction, has often been labelled the “literature of exhaustion,” after John Barth’s seminal essay. In fact, Barth is considerably less pessimistic than his essay’s title might suggest, and certainly less cynical about the possibility for regeneration than many of the myriad postmodern theorists and critics who have cited him. Barth does find a form of creativity in reflexivity: Borges’s “Tlön, Uqbar, Orbis Tertius” is taken to illustrate “how an artist may paradoxically turn the felt ultimacies of our time into material and means for his work – *paradoxically* because by doing so he transcends what had appeared to be his refutation.”²⁷ This paradox was equally evident, of course, in the many Romantic poems that took as their subject matter the impossibility of writing poetry. As Hamilton suggests, in these cases, the “failure of the self to achieve its goal is recuperated as autobiography” and the inability to create is in fact creatively expressed, thereby fulfilling Romantic criteria for creativity.²⁸ In our own times, it would appear, reflexivity is not often recognized as sufficiently creative: it is far more likely to be associated with a lack of authenticity, a clichéd trick played on the weary reader, and with the more ludic practices of postmodern art, which flaunt their non-originality through parody, plagiarism, and simulation. For Raymond Federman, for example, reflexivity reveals that “there is nothing original about literary creation, and that the creator’s imagination is not unlimited and endless, but that, indeed, the creator merely imitates, parodies, mimics, repeats, plagiarizes.”²⁹

Reflexivity has, according to Federman, alerted us to the fact that literature is about nothing other than itself; it has also dismantled two (Romantic) “myths” about literature, these being the author as the “sovereign consciousness which is the origin of the work,” and “the idea of originality”:

the day ART in general (and LITERATURE in particular) began to reflect upon itself, to turn inward so to speak, and even to mock itself, in order to question, examine, undermine, challenge, and even, at times, demolish its purpose, its intentionality,

and its own means of production and communication, it began to abolish these two myths.³⁰

That genuine innovation and revolution are always signified as an absence and a lack in postmodern culture, however, and that the latter has not invented competing ideas of real creativity, suggests on the contrary the degree to which postmodern thinking remains firmly locked within Romantic paradigms of creativity. Rob Pope considers that “Perhaps the greatest obstacles to a genuinely critical and historical understanding of creativity is the persistent stereotype of the ‘Romantic writer’ and the ‘Romantic artist.’”³¹ If the vision of the Romantic genius flowed from the divine inspiration of gods and muses (or from the more mortal temptations of opium), Pope suggests that creativity today still retains much of the mystique arising from its association with unconscious processes, although these are now expressed in psychological terms as “the unseen promptings and subterranean eruptions of unconscious desires, hopes, fears.”³² That Romantic notions of the creative self – together with the Romantic practice of literature as a reflexive and philosophical project – still underpin our understanding of literature and critical theory is the central argument put forward in Philippe Lacoue-Labarthe and Jean-Luc Nancy’s *The Literary Absolute: The Theory of Literature in German Romanticism*. The discussions presented here of texts by Martínez, Piglia, and Cohen will often converge around the question of the extent to which they reinforce or deviate from this Romantic legacy; a more explicit engagement with Lacoue-Labarthe and Nancy’s argument is reserved for the Conclusion.

SCIENCE AND CREATIVITY IN ARGENTINE LITERATURE

This book joins in an ongoing discussion of the different ways in which literature may engage with science, a topic that has attracted particular interest in recent decades following the publication of seminal studies by Hayles, Livingston, William R. Paulson, and David Porush, among others.³³ Most

of this work has referenced anglophone literature; I aim to explore some key differences in the ways that science has been imagined in contemporary literature from Argentina. These differences, as I will show, shed new light on the role of literary engagements with science in postmodern thought and fiction.

A fertile interest in scientific ideas has characterized much Argentine literature since the mid-nineteenth century, and this has inspired some noteworthy scholarship. Roberto González Echevarría's *Myth and Archive: A Theory of Latin American Narrative* (1990), focussing principally on the nineteenth century, explores (among other trends) the influence of scientific travel writing on Latin American literature. In Sarmiento's foundational text, *Facundo* (1845), he finds classificatory gestures and tropes proper to scientific modes of travel writing, and above all an intent to mix natural and social science, responding to a belief that the instruments and methods of each were alike in their ability to penetrate realities and to expose them to observation.³⁴ In his *Test Tube Envy: Science and Power in Argentine Narrative*, J. Andrew Brown finds an appeal to "scientific" discourses such as phrenology to underpin the narratives of many writers associated with the Generation of 1837, including Sarmiento and José Mármol, bolstering the authority of their texts as political and social treatises.³⁵ Indeed, he finds that writers of a later generation, such as Lucio V. Mansilla, continue to draw on science (and indeed, phrenology) to support their rhetoric, this time wielding it as a weapon in a battle against the political values of their predecessors.³⁶ Brown notes perceptively that the legitimizing exercise works both ways: while the appeal to scientific discourse and the self-fashioning of the writer as objective observer effectively appropriate the cultural authority of science, they also act to construct that same authority.³⁷

The decades bridging the nineteenth and twentieth centuries provide the context for an examination of the interplay between literature, medical discourse, and nationalism in *Ficciones somáticas: Naturalismo, nacionalismo y políticas médicas del cuerpo (Argentina 1880–1910)* by Gabriela Nouzeilles (2000). In her corpus of naturalist novels by Eugenio Cambaceres and others, Nouzeilles traces ways in which medical discourse ultimately provides writers with "un criterio de autoridad para legitimar ciertos prejuicios

sociales” (normative criteria in order to legitimize certain social prejudices), particularly in relation to Argentina’s experience of mass immigration.³⁸ In her study of early science fiction in Latin America, Rachel Ferreira Haywood also notes the importance of scientific discourse in the nation-building projects of nineteenth-century texts. Even in proto-science fiction novels such as Eduardo Holmberg’s *Viaje maravilloso del Señor Nic-Nac al Planeta Marte* (1875), for example, literature and science are presented as “natural partners” in the process of developing a modern, scientifically informed nation.³⁹

What marks the narratives of the Generation of 1880 more broadly, however, is a crucial ambivalence towards the science that appeared to make their modernizing projects possible. Eduardo Ezcurra’s futuristic *En el siglo XXX* (1891) imagines a series of technological advances but demonstrates little confidence in the social benefits of scientific modernization. Oscar Terán observes that what is unusual about the modernizing process in Argentina is that its most zealous promoters were also those who expressed the deepest doubts about the consequences of their reforms. Thus Vicente Quesada laments the disappearance of the old farms and tall cypresses to make room for the railway in *Memorias de un viejo* (1889)⁴⁰ but at the same time envisions a future society enriched by European goods and customs.⁴¹

This ambivalence carries through to the twentieth century, even while – as Brown argues – we witness a continued strategic use of scientific discourse to bolster the authority of the literary text. A dystopian vision of science starts to emerge clearly in the work of writers such as Lugones, Quiroga, and Arlt. Beatriz Sarlo observes that the proliferation of stories about monkeys, such as “Yzur” (1906) by Lugones and “El mono ahorcado” (1907) by Quiroga, owes much to the ideas of Darwin and Haeckel that were circulating freely in intellectual circles at the time.⁴² The discovery of the shared heritage of man and monkey fuelled a series of fantastical tales of cultural regression and barbarism. Arlt’s novels of the 1920s and 1930s bring into the sphere of literature a heterogeneous collection of non-literary images and discourses, including metallurgy, aviation technology, and electricity. As Sarlo points out, there is nothing particularly new about his dystopian visions of an alliance between science and authoritarianism.⁴³ The genre of dystopian science fiction was already rapidly taking form, following

novels such as Yevgeny Zamyatin's *We* (1924) and Aldous Huxley's *Brave New World* (1932). What is unusual in Arlt's fiction, however, Sarlo suggests, is that "Lo que es instrumento de una sociedad autoritaria (y enloquecida en su autoritarismo), es al mismo tiempo material de ensoñación y fuente de belleza" (that which is an instrument of an authoritarian society [authoritarian to the point of insanity], is at the same time the material of dreams and a source of beauty).⁴⁴

Several recent studies have been published on the mathematical and scientific paradigms that may have informed stories by Jorge Luis Borges or may be retrospectively read in relation to his work. Of these, the most extended is Floyd Merrell's *Unthinking Thinking: Jorge Luis Borges, Mathematics, and the New Physics* (1991). Brown points out a central irony in this critical approach, as Borges's work – which rejects science as an explanatory framework, alongside all systems of human knowledge – appears to be valued in certain critical approaches precisely for its ability to anticipate new explanations deriving from chaos theory or quantum mechanics.⁴⁵ However, as Hayles argues (and Brown concedes), Borges's work certainly provides evidence for the "field model," a term used by Hayles both to describe the development of parallel interests in science and literature and to define an important transformation in thought over the twentieth century that approaches the universe through networks, relationships, and dynamic change rather than attempting to isolate its workings in time and space from the detached position of an observer.⁴⁶

This study differs from those of González Echevarría, Brown, Nouzeilles, and Sarlo, cited above, not only in its closer focus on contemporary literature, but also in its approach: my primary interest is in the way that the writers discussed here engage with scientific notions and paradigms within a highly reflexive approach to fiction-writing. In other words, I argue that their texts do not simply register, or even reshape, imaginaries that derive in part from the dissemination of scientific ideas within culture, but instead experiment with those ideas as models for creating fictions and for evolution and innovation in literature. Thus this book moves beyond a discussion of how scientific ideas are reproduced and refracted in literature to explore how such concepts may be used to reflect on the creative practice of

literature itself. In some ways, it may be considered an extension of Brown's work in *Test Tube Envy*, which begins in the final chapter to discuss more recent developments in Argentine literature. Brown observes a key shift in the use of science in narratives between the nineteenth century, where science is very much in the employ of politics, to the twentieth, when it becomes caught up in explorations of a metaphysical or philosophical nature.⁴⁷ Here, I discuss uses of science in literature since the 1980s that could be seen to mark a third iteration: to explore the metaliterary, or, more generally, the nature of human creativity.

A number of Argentine authors of recent years have drawn on scientific ideas in their work or experimented with modes of science fiction. Angélica Gorodischer is the nation's most well-known contemporary writer associated with the genre, although her fiction contains little "hard" science and focusses instead on exploring issues of gender in imaginary or futuristic worlds. Ana María Shua (*La muerte como efecto secundario*, 1997) and Eduardo Blaustein (*Cruz diablo*, 1997) have made incursions into the science fiction genre, as has César Aira (*Los misterios de Rosario*, 1994; *El congreso de literatura*, 1999; *El juego de los mundos*, 2000). However, the three writers chosen for this study – Piglia, Cohen, and Martínez – stand out from these in their sustained and explicit treatment of scientific theories as tropes and motors for literary innovation.

Science, mathematics, and the nature of creativity become central concerns in the work of all three. Cohen's fiction often approaches the genres of science fiction and the fantastic, creating worlds that are broadly familiar to us but in which certain trends are hyberbolized, from neoliberalism and monopoly capitalism to plastic surgery and robotics. Written in an apparently realist style, Cohen's fiction continually disarms the reader by slipping in neologisms (such as *flaytaxi* or *pantallátor*) that often evoke the technological landscape of a future society, or one that is organized in subtly different ways to our own. Cohen refers to his own use of neologisms as "un juego y una manera más de escapar de la realidad a la que nuestro lenguaje nos sujeta" (a game and another way of escaping the reality to which our language subjects us).⁴⁸ Placed within a richly suggestive prose that often blurs the distinction between metaphorical and literal meaning, they help to generate the effect

of a virtual space that is somehow borne of, or connected to, our world but operates in a different dimension, as indeed it does: that of literature. Many of Cohen's narratives are located in an invented place, the Delta Panorámico, that references the real Argentine delta to the north of Buenos Aires and bears some social and cultural resemblances to present-day Buenos Aires and Argentina but evades direct interpretations of this kind. His characters live in hypermediatized societies in which they – and we as readers – often find it difficult to ground the many projections that surround them and to distinguish reality from simulation.

Cohen's literary work demonstrates a prominent interest in exploring realms of the intersubjective. Characters in many of his texts have access to the *Panconciencia*, a kind of virtual network that allows them to access other people's memories and experiences; in *Donde yo no estaba* (2006) he pursues a highly fluid understanding of subjectivity as a series of interpenetrations that take place between the self and the other, and he radicalizes the idea in *Casa de Ottro* (2009) by including technological objects in such exchanges. Throughout his fiction, subjectivity is consistently de-individuated, and he draws attention to the illusions of continuity that govern the use of the first-person in narration, or the construction of an authorial style.

Cohen often chooses to explore such concerns through the lens of scientific discourses on chaos theory, emergence, and complexity. His work abounds in references to waterfalls, fractals, turbulence, and a range of other forms and metaphors that have been used in chaos theory to understand a particular kind of order that emerges from apparently random systems. Indeed, much of Cohen's fiction, as I will show, can be read as a kind of literary experiment with principles of narrative construction suggested by the dynamics of complex systems in biology and physics. The theory of "realismo inseguro" (unstable realism) he develops in his critical work owes a considerable debt to the dissipative structures described by the physical chemist Ilya Prigogine, whose theory led to new research into self-organizing systems while earning him the Nobel Prize in Chemistry in 1977.

While apparently less well versed in these particular developments, Piglia also turns to mathematical and scientific theories in his exploration of the nature of literary creativity. His narratives also brush with science fiction

where, like Cohen, he demonstrates an interest in de-individuated subjectivities and in the virtual experiences offered by literature. Artificial memory implantation, for example, becomes a trope in his fiction for the way in which literature inserts the memories and experiences of another into our own, through the experience of reading. Just as the many diaries, letters, sacred texts, and artefacts of Piglia's texts are not clues to be deciphered, pointing us to some meaning originating in the past, but are consistently mined for their capacity to predict and shape the future, so literature for Piglia becomes not a way of registering past or present realities but a "laboratory of the possible," a tool for generating new potential meanings for the future.⁴⁹

This vision unites the apparently very different texts that make up Piglia's *oeuvre* to date. This includes his densely citational first novel, *Respiración artificial* (1980), which sets up a series of shifting and interchanging perspectives between the mid-nineteenth century and the present in its exploration of utopian ideals, betrayal, and political repression, *La ciudad ausente* (1995), a collection of short stories linked by a paratext that borrows from detective and science-fiction genres, and *Blanco nocturno* (2010), a rather Arltian crime narrative with a mad inventor at its heart. Piglia's writing embraces a vocabulary of microscopic observation and biological experimentation, tracing the continually dynamic interchanges between an organism and its environment that underpin autopoietic, or self-renewing, systems. Literature for Piglia becomes a combinatory art that works much in the same way as the endless variations produced by genetic recombination.

Martínez trained as a mathematician before turning to fiction-writing and has continued to publish and lecture on mathematical ideas in literature and critical theory. His *Borges y la matemática* (2006) presents a relatively light-hearted discussion of some of Borges's most well-known short stories in the light of concepts of infinity, Cantor's set theory, and other mathematical hypotheses, setting himself the challenge of explaining the links to a general public with no greater knowledge of mathematics than the ability to count to ten. The later and more heavyweight *Gödel (para todos)* (2009) again attempts to explain Gödel's theorems to non-mathematicians and – as mentioned above – to expose its inaccurate use by theorists such as Kristeva, Lacan, Debray, Deleuze, and Lyotard. As well as critical essays on Argentine and

world literature, he has published several novels and short stories for a more popular market in Argentina and abroad; his *Crímenes imperceptibles* (2003) has been translated into over thirty languages and adapted for the cinema (*The Oxford Murders*, dir. Alex de la Iglesia, 2008). Most of his fiction draws on mathematics in some way: his characters are often mathematicians, and his plots frequently hinge on a fatal misunderstanding, ignorance, or belated discovery of a mathematical principle or hypothesis, such as Wittgenstein's rule-following paradox (*Crímenes imperceptibles*), the nature of chance (*La muerte lenta de Luciana B.* (2007), or an imagined alternative to the law of excluded middle (*Acerca de Roderer*, 1992). Martínez is also deeply interested in questions of artistic creativity and evolution, the major themes of his novel *La mujer del maestro* (1998) and of several of his critical essays.

The approaches of these three writers to science diverges radically from those of their predecessors in Argentine literature. There is nothing here of the attempt by Sarmiento, Mármol, or Mansilla to use scientific discourses to shore up the authority of their understanding of Argentine society or to promote a modernizing project. Neither do we detect a clear critique of science's baleful influence on modern society; nor is science marshalled to explain the essentially barbaric nature of a humanity descended from apes, in the way that it would in a short story by Lugones or Quiroga. Nor yet again do we witness the kind of emptying-out of science's claims as a metanarrative to explain the universe that is evident in Borges's fictions. Instead, science is reclaimed for its ability to tell a particular story about human creativity: the creative power of dialectical thought and artistic practice (Martínez), of textuality as an open system, constantly renewing itself through complex exchanges with its environment (Piglia), and of human innovation as a joyously indissoluble part of a self-organizing, creative universe (Cohen).

Alongside Borges, it might be tempting to posit Julio Cortázar as a precursor to the fiction of Martínez, Piglia, and Cohen. A number of critical studies have explored the shifting and provisional nature of subjectivity in Cortázar's fiction and the indeterminacy at the heart of *Rayuela's* structure in the light of quantum physics, cybernetics, and other scientific advances of the twentieth century.⁵⁰ The breakdown of conventional boundaries between observer and observed in short stories such as "La noche boca arriba"

and “Axotlotl” and Cortázar’s notion of the “figura” – a form of patterning that brings individuals or actions into a relationship despite separation in time and space – would seem to justify this kind of analytical approach. However, however eagerly they are seized upon by critics, there are just a few passing references in Cortázar’s fiction and critical work to theories such as Heisenberg’s uncertainty principle, and scientific theories never play a foundational role in his theory of literary creativity, as they do in the work of the three writers studied here.⁵¹ Further, it is clear that Cortázar’s appeal to quantum realities is an attempt to drive a wedge between rational and irrational approaches to the universe (and to give weight to his own anti-rational view of reality), and that this becomes part of a quasi-Romantic attack on Cartesian certainties. Thus Cortázar, rather like Borges in his appropriation of Cantor, draws on science in order to undermine its premise of rationalism. This binaristic vision, pitting rationalism/science against anti-rationalism/literature is emphatically not one that is pursued in the work of Piglia, Cohen, or Martínez.

Their texts’ reflexive use of scientific paradigms often produces an entirely different perspective on the relationship between science and creativity when compared to previous generations of Argentine writers. As an example, we might compare Arlt’s appropriation of the science of evolution as a metaphor for social struggle with Piglia’s appeal to the role of genetic recombination in evolution as a metaphor for literary innovation, explored in Chapter 4. As Brown observes, while questioning the value and power of science in society, Arlt continues to draw on scientific paradigms (and particularly Darwinian ones) in the construction of his plots: thus, *El juguete rabioso* (1926) imagines a society that is governed by the rules of Darwinian natural selection and the survival of the fittest and constructs a narrative arc that fits the model.⁵² The novel becomes a lament on the erosion of individual creativity and humanity in a rapidly modernizing, capitalist world. By contrast, Piglia, who also draws in his work on evolutionary models developed in biology, does not primarily do so to construct metaphors for social and cultural phenomena, but for the process of writing itself. This opens up a wholly different reading of the relationship between creativity and the science of evolution: rather than mourning the crushing of individual creative

talent in a brutal battle for supremacy, Piglia celebrates the ever-changing, infinitely varied work of genetic recombination that guarantees the survival and flourishing of literature.

DIALOGUES AND DIVERGENCES WITH EUROPEAN AND NORTH AMERICAN LITERATURE

Indeed, in their exploration of scientific ideas, these authors dialogue most clearly not with national literary traditions but with European and North American writers: specifically, those authors whose work in the 1960s and 1970s formed part of a new wave of speculative literary interest in “new” scientific hypotheses, such as cybernetics, self-similarity (fractals), entropy, and chaos, and the popularization of older ones, such as Heisenberg’s uncertainty principle and Gödel’s incompleteness theorems. It is clear from Cohen’s fictional and critical narratives that he understands his own work to engage to a significant extent with the 1960s and 1970s novels and stories published by Thomas Pynchon, William Burroughs, and J. G. Ballard. Piglia’s main referent – in his exploration of mathematical and scientific ideas at least – is Ítalo Calvino, whose most relevant works were published between 1967 and 1972. Martínez’s literary influences are eclectic and cannot be tied down to a particular period (they include Thomas Mann and Henry James as well as Borges and Piglia himself), but his principal frames of reference are the transnational genres of the crime thriller and the detective story.

In placing the work of Piglia and Cohen in dialogue with fiction by Pynchon, Ballard, Calvino, and others in this book, then, my first aim is to probe more deeply into an already existing critical and literary engagement on their part with this earlier generation of European and North American writers and to expose some key differences in the way that they appropriate scientific ideas. These differences are not replicated in more contemporary U.S. fiction, although a number of writers – including Lewis Shiner and Bruce Sterling – continue to engage with theories of entropy and complexity, for example. I return in the Conclusion to contrast Piglia and Cohen more

directly with their contemporaries in North America. In the meantime, investigating the relationship they forge with a previous generation also allows us to trace the dynamics of literary change, a very prominent theme in the work of Piglia, Cohen, and Martínez and one that is often expressed with reference to scientific models of evolution.

In contrast to the more apocalyptic strains of British and North American fiction, the work of these Argentine writers presents a strikingly different vision of human creativity, marshalling scientific ideas, not as tropes for social, moral, or cultural decline, but as evidence of quite the reverse: of the endless, self-renewing capacity of literature. This crucial difference can partly be attributed to the particular interpretation given to certain scientific theories in these texts. Cohen, for example, follows the much more positive version of entropy developed by Erwin Schrödinger and Ilya Prigogine, who emphasize (in consonance with more recent developments in theories of complexity, self-organization, and emergence) the order that may be hidden within chaos or arises from it, and that may yield statistical truths, if not absolute ones. As Norbert Wiener observes, the second law of thermodynamics, while it may accurately describe what takes place within a closed system, is not valid with respect to a part of this system that is not wholly isolated; hence, “There are local and temporary islands of decreasing entropy in a world in which the entropy as a whole tends to increase.”⁵³ Self-organization does not contradict the laws of thermodynamics discovered in the nineteenth century but essentially posits an open system rather than a closed one. This makes all the difference as, until we have found its limits, we can exchange a view of the universe as running down towards stasis and heat-death for one of the universe as an endlessly self-renewing entity.

However, it is perhaps these authors’ interest in innovation of the literary rather than the scientific variety that provides the principal motivation for their unusual appropriation of scientific theories as metaphors for creativity rather than for decay or dissolution. If in Pynchon, Ballard, Burroughs, or Philip K. Dick, for example, scientific theories are set to work to bolster a particular vision of the world beyond the text as heading towards global disaster or decline, in the fiction of Martínez, Piglia, and Cohen, they are primarily mobilized in a reflexive manner to explore the continually creative

and self-renewing capacity of literature. The literary text becomes a paradigmatic instance of how newness is generated through a series of processes observed by science, including autopoiesis (Piglia), complexity (Cohen), and through the dialectical evolution of scientific knowledge (Martínez). For a similar reason, machines and automatic processes in Piglia's texts, which often account for the transsubjective nature of literary praxis, rarely become ciphers for the loss of human creativity, but instead for its continual self-renewal.

ROMANTICISM AND FORMALISM

This book diverges from existing studies of the inscription of scientific ideas in Argentine and Latin American literature in its explicit focus on notions of creativity in science and the arts. It also pursues a specific argument regarding the contradictory persistence of both Romantic and Formalist ideas of literary creation and evolution in postmodern thought. As I will show, Martínez, Piglia, and Cohen explore post-Romantic notions of creativity that take seriously the possibility of artistic innovation in our age and question our continued self-subjection to Romantic notions of authorship and originality, often expressed in postmodern culture as a lack. Paradoxically, this new direction (as we will see) involves a selective return to, or a reworking of, certain forms of subjectivity and ideas of newness that are also associated with Romanticism. However, it consistently maintains a critical distance from a Romantic-postmodern rejection of science and technology as over-rigid, alienating, and inhuman.

Of the three writers explored here, it is Martínez, with his mathematician's training, who presents the most direct challenge to common, Romantic-inspired, misconceptions of science as dogmatically empiricist. The relationship between science and literature cannot be reduced for Martínez to a tension between rationalism and irrationalism, dialectical rigour and creative inspiration. Both literature and science evolve by means of all of these, and his work expresses a reasoned belief in the continued

potential for innovation in both science and literature, as each battles against tradition to find new forms and syntheses according to a dialectical principle. Piglia also steers well away from the usual Romantic-postmodern critique of mechanistic science: while the great majority of other fictional works that cite Gödel's theorems do so in order to puncture science's perceived complacency, in Piglia, Gödelian self-reference is not presented as a calamitous threat to logic and epistemological enterprise but becomes a point of entry into multiple worlds that enrich our understanding of the complex relationship between the real and the imagined, the material and the virtual.

However, as Hayles points out, there are a number of continuities between Romanticism and what she variously calls the "cosmic dance," "the cosmic web," or a field model of the universe. These share with the Romantic metaphor of the "organism" an understanding that "the whole cannot be adequately represented as the sum of its parts," together with "an emphasis on the dynamic, fluid nature of reality."⁵⁴ The work of Piglia and Cohen in particular allows us to reconstruct part of the Romantic heritage of the "new" science of chaos, emergence, and uncertainty.

In their exploration of the nature of creativity, Piglia and Martínez also return to certain ideas propounded by the Russian Formalists. These ideas may, in many ways, be understood as antithetical to Romantic ideas of art and creativity. Formalist theories of literature bypass the individual author, the hallowed genius of Romanticism, to focus on the self-renewing power of literature and the generation of new ideas and forms through the combination and recombination of different elements and devices. Literature does not emerge from divine inspiration or communion with nature, as it did for the Romantics; nor is its worth measured by its ability to throw up original insights. Instead, literary change for the Formalists is the effect of a dialectical struggle of forms, in which the individual writer plays only an accidental part.

Among the analyses of novels, short stories, and critical essays presented here is a new reading of *Respiración artificial*, developed in the light of Piglia's debt to Formalist theory, an influence that has gone all but unperceived in critical work on the novel. A focus on this debt, which leads Piglia to explore and advocate forms of writing that might be described as "anti-testimonial,"

allows us to grasp just how radical Piglia's literary project was in the context of the 1970s in Argentina; it also lays the groundwork for an understanding of his use of tropes from science and technology to explore the nature of creativity in literature.

Both Piglia and Cohen distance themselves from psychoanalytical approaches to subjectivity and literary interpretation, which elevate the author as the centre of meaning of his or her work, however deep in their unconscious such meanings may be buried. For Piglia and Cohen, literature does not *manifest* a series of symptoms to be analyzed and interpreted; instead, it *constructs* experience and affect. The framework within which Cohen pursues these ideas is not Formalist, however, but primarily a Deleuzian one. Examining these three writers' appropriation of scientific models and theories in their exploration of literary creativity allows us to glimpse an unexpected continuity between Formalist literary theories and Deleuzian thought, a connection – among others – that is explored further in the Conclusion.

SCIENCE AND LITERATURE: BEYOND TWO CULTURES VS. ONE CULTURE

In giving this book the subtitle “Between Romanticism and Formalism,” my intention is to suggest a particular way that we might understand the tensions emerging in these texts between different ideas of science and creativity but also to emphasize that, while they explore concepts borrowed from mathematics and sciences, their primary field of intervention remains that of literary history and theory. New paths emerge through these writers' alternative – and more productive – recombination of the Romantic and Formalist legacies that underpin some of the contradictions of postmodern thought. These texts function as machines that bring other “machines” – texts, theories, discourses, images – into contact with each other to produce often surprising combinations. In place of conventional hermeneutics, Martínez, Piglia, and Cohen develop and practise an alternative, non-hierarchical, rhizomatic

method of approaching texts that – very much in a Formalist vein in the case of Martínez and Piglia, and with closer reference to Deleuze and Guattari’s thought in that of Cohen – focusses on construction rather than decoding, surface rather than depth, and resonance rather than meaning.

Like Deleuze and Guattari, Piglia and Cohen in particular develop a theory of literature that emphasizes its role in *creating* experience and affects rather than representing them. This approach distances us from an understanding of literature as a potentially deceptive medium that emerges both in the kind of symptomatic readings of postmodernism delivered by Fredric Jameson (combining Freudian and Marxist approaches to literary criticism) and in the many schools of criticism that have drawn attention to the hidden ideological investments lurking beneath the surface of the text. For Cohen, the task of the contemporary novel is to “re-enchant the world” and to dissolve the false dichotomy between reason and imagination: deception is wrought not by the construction of fiction and illusions but by an overly rigid use of language as a referential system, while the ambiguity of literature prevents it from being reduced to a single logic.⁵⁵ For both Cohen and Piglia, it is in literature’s irreducibility to straightforward communication, its preference for recursion rather than referentiality, and in its marginality from mainstream culture, that its greatest potential for meaningful intervention may be found, a paradox also inherent to Deleuze and Guattari’s concept of a “minor literature.”

However, while their primary interest is in the workings of literature, these writers’ appropriation of scientific models and theories also carves out alternative ways of thinking more generally about the relationship between literature and science. If these texts largely reject postmodernism’s Romantic suspicion of science, they articulate another, somewhat contradictory, aspect of Romantic discourse: the hoped-for synthesis of science and literature. As Joel Black reminds us, it would be misleading to categorize the Romantics as “scientific rebels,” as “The leading figures of romanticism were transgressing visionaries who aspired to achieve a grand synthesis of poetry and science.”⁵⁶ This appears more achievable as an aim if science is depicted as a source of creative contradiction, of emerging hypothesis rather than monolithic absolutism, a vision that emerges most clearly in Martínez’s work.

Black points out that at the time Wordsworth and Schlegel were writing, “the modern sciences of biology and psychology did not exist as such; the romantic project was precisely to formulate a science of life and a science of mind.”⁵⁷ Furthermore, Black suggests that “Far from having negligible scientific value, as Eichner claimed, romanticism may be regarded as having provided the culture (in both the bacteriological and humanistic senses) necessary for the concept of life itself to come into being.”⁵⁸ It would not be an overstatement to consider the work of Piglia and Cohen in particular as contributing to this project of formulating a science of life, in which literature does not take up a transcendent position of distanced observation but is wholly immanent to the flows of energy and matter that shape and renew life and all material processes in the biological and physical worlds. If social scientists and cultural theorists have been criticized for misappropriating entropy, complexity, autopoiesis, and self-organization to construct dubious analogies, several literary critics have insisted that the use of such models in literature, and particularly postmodern, reflexive literature, is *not* metaphorical. Peter Stoicheff, for example, argues:

The crucial purpose in exposing the chaos and complexity of metafiction is not to provide another vocabulary through which to speak of a text; nor is it to suggest that the dynamics of metafiction are *like* those of chaos or of complex systems. Instead, it is to show that metafiction displays the properties located in what science calls chaos, and that a metafiction text *is* a complex system.⁵⁹

Literary texts are not mimetic representations of a phenomenon occurring somewhere beyond them but participants in a series of creative and self-organizing processes that shape, and are shaped by, them. This view of creativity is not antithetical to that held by a number of scientists: the theoretical physicist David Bohm, for example, argues that the creativity of the human mind does not simply mimic the creativity of nature but is of exactly the same order.⁶⁰ Similarly, Erich Jantsch suggests that “In a dualistic world view it used to be the muse of divine inspiration which used the artist as

instrument. In the non-dualistic world view, however, the creative process appears as an aspect of evolutionary self-organization.”⁶¹ To this, as we will see, Piglia and Cohen would add the creativity of machinic or inanimate processes, which often become indistinguishable in their work from organic ones. Indeed, in the growing “connectionism” that Sadie Plant observes to have arisen from the study of complex systems, “Distinctions between the human, the natural and the artificial are scrambled, and whatever was once said to belong to each of them finds a new basis on which to connect in the dispersed and connective processes which link them all.”⁶²

Ultimately at stake in our evaluation of literature’s borrowings from science is the question of how literature should be read in relation to the world beyond it: as a textual representation of systems described by science, or as a system in and of itself, operating in conjunction with other, non-literary systems, but according to the same principles of life, movement, and growth that govern them. As Hayles, Brown and many others have pointed out, “Literature is not simply a place where you see scientific and technological ideas replicate themselves.”⁶³ Brown identifies as damaging to serious interdisciplinary work what he calls a “show-and-tell criticism” that suddenly “discovers” in Borges’s “El jardín de senderos que se bifurcan” an anticipation of Hugh Everett’s many-worlds theory.⁶⁴ In different ways, the writers I focus on in this book ask a more far-reaching question: if literature is a system, what kind of system is it? How does it function with other systems around it? How does it create newness rather than simply represent or recycle the already-existing?

Although Martínez, Piglia, and Cohen write with close reference to European and North American literary theory and praxis, their highly reflexive and metafictional approach to the question of the relationship between literature, mathematics, science, and technology often reconfigures the forms and terms of existing debates. The syntheses these writers imagine between literature and science – and that they allow us to imagine in turn – are, I will suggest, more productive and nuanced than many of those that have shaped recent debates in European and North American academies, so often polarized around the “two cultures” and “one culture” perspectives.