



BORGES'S SCIENTIFIC DISCIPLINE

J. Andrew Brown

Washington University in St. Louis

One of the fundamental aspects of Jorge Luis Borges's writing has been its tendency to question philosophical and scientific constructions of reality. Ana María Barrenechea has noted: "Tal vez la más importante de las preocupaciones de Borges sea la convicción de que el mundo es un caos imposible de reducir a ninguna ley humana" (53). Donald Shaw concurs in his study of Borges's *Ficciones*: "'Tlön, Uqbar, Orbis Tertius' is concerned with the deeply rooted human desire to find in the world some appearance of order and design, and thereby some hope of finality. Borges administers a gentle snub to those who feel this urge" (13).¹ This well-known tendency has exercised an important influence on twentieth-century thought. Michel Foucault credits Borges with his own groundbreaking work on the discursive and cultural power structures that underlie scientific thought in the preface to his landmark *The Order of Things*:

This book first arose out of a passage in Borges, out of the laughter that shattered, as I read the passage, all the familiar landmarks of my thought—our thought, the thought that bears the stamp of our age and our geography—breaking up all the ordered surfaces and all the planes with which we are accustomed to tame the wild profusion of existing things, and continuing long afterwards to disturb and threaten with collapse our age-old distinction between the Same and the Other. (xv)

1. To attempt an exhaustive review of this phenomenon in Borges's writing would take more space than the article. I would refer the reader also to Alazraki and Bell-Villada among myriad studies for further discussion.

Foucault continues with a description of a passage from Borges's "El idioma analítico de John Wilkins" that mocks the desire to codify and organize by describing an incredibly absurd Chinese taxonomy.² If this adroit skepticism has rightly given rise to the assumption that philosophical and scientific projects meet sticky ends in Borges's writing, it masks a tendency in his early writings to present and employ scientific theory as a guarantee of meaning and of rhetorical authority. Indeed, in certain early essays, we see science as a discipline that enjoys philosophical prestige precisely because of its ability to interpret a chaotic reality. The purpose of this study is to examine one essay in particular that belies the dismantling of systems of thought that would become one of Borges's favorite themes.

By so doing, I will argue that Borges participates in a nineteenth-century practice connected with positivism in which authors called upon the scientific theory of their time as a cultural touchstone for their political and philosophical arguments. Domingo Sarmiento's use of Alexander Von Humboldt as a guarantee of his politically motivated description of Facundo Quiroga and Juan Manuel Rosas is well documented, as is the influence of that practice throughout nineteenth-century Latin American writing.³ Science became, in many texts, a guarantee of the ideas and ideologies presented by authors who incorporated and imitated scientific discourse as a source of cultural authority for their writing. The practice, which has been called literary "test tube envy" elsewhere, serves as one of the nineteenth century's defining characteristics, as Roberto González Echeverría has argued so convincingly in his *Myth and Archive*.⁴ While this literary strategy has been seen

2. Foucault refers to the following excerpt:

Esas ambigüedades, redundancias y deficiencias recuerdan las que el doctor Franz Kuhn atribuye a cierta enciclopedia china que se titula *Emporio celestial de conocimientos benévolos*. En sus remotas páginas está escrito que los animales se dividen en (a) pertenecientes al Emperador, (b) embalados, (c) amaestrados, (d) lechones, (e) sirenas, (f) fabulosos, (g) perros sueltos, (h) incluidos en esta clasificación, (i) que se agitan como locos, (j) innumerables, (k) dibujados con un pincel finísimo de pelo de camello, (l) etcétera, (m) que acaban de romper el jarrón, (n) que de lejos parecen moscas. (2: 85-86)

3. The issue has received a great deal of attention, from González Echeverría's landmark *Myth and Archive*, in which he argues that scientific writing served as an archive of authorized knowledge and models for writing in the nineteenth century, to Mary Louise Pratt's essential exploration of the effect of the scientific traveler on nineteenth-century interpretations of Latin America. See also Silva Guesz's article on the importance of popular scientific disciplines like physiognomy on nineteenth-century Argentine narrative and poetry.

4. See Brown for a consideration of twentieth-century test tube envy in Mempo Giardinelli's *Imposible equilibrio*. González Echeverría locates the literary use of scientific discourse more firmly in the nineteenth century, arguing for a shift in "master story" in the twentieth.

to endure in the twentieth century, one would not expect its appearance in the work of an author who inspired Foucault's critical description and concomitant dismantling of the scientific drive towards taxonomy. Indeed, the identification of a literary appropriation of scientific authority in the nineteenth century owes much of its inception to Foucault's work on power and discourse. Nevertheless, as we will see in the early essay "La doctrina de los ciclos" from his 1936 *Historia de la eternidad*, there is evidence of a practice that would seem to confirm the assertion made in *Respiración artificial* by Ricardo Piglia's literary alter ego, Emilio Renzi, that Borges was "un escritor del siglo XIX. El mejor escritor argentino del siglo XIX" (130). While Renzi (and Piglia) base their argument on the nineteenth-century paradoxical combination of gaucho fascination with an obsession for Europe that they find equally prevalent in Borges's work, the early appearance of a textual reliance on scientific authority strengthens that connection while simultaneously complicating the image critics have created of Borges as the destroyer of intellectual systems par excellence.

Borges's essay on Friedrich Nietzsche's concept of Eternal Return (I capitalize the phrase following Borges's example), "La doctrina de los ciclos," presents us with the most clearly delineated example of the nineteenth-century phenomenon. The essay contains one of his most clearly and carefully planned rhetorical attacks on Nietzsche, a philosopher whose work he was known to despise.⁵ The *doctrina*, as Borges describes it, states,

El número de todos los átomos que componen el mundo es, aunque desmesurado, finito, y sólo capaz como tal de un número finito (aunque desmesurado también) de permutaciones. En un tiempo infinito, el número de las permutaciones posibles debe ser alcanzado, y el universo tiene que repetirse. (1: 385)

The author then remarks that the idea moves from an "insipid" beginning to a terrifying conclusion and that it is common to attribute the idea to Nietzsche, although Nietzsche was certainly not the first to propose the concept. The rest of the essay presents a series of philosophical and scientific challenges to the theory, moving from explanations of the size of an atom to

5. As with most subjects, a good deal of criticism has been dedicated to Borges's disdain for Nietzsche's philosophy as well as the possible influence that the German philosopher may have exercised on Borges despite the intellectual antipathy. See, in particular, Selnes and Halpern.

a consideration of Georg Cantor's theories on infinite sets and transfinite numbers to the implications that the laws of thermodynamics hold for Eternal Return. The essay also considers the positions of Christian, Jewish, and Greek philosophy in relation to Nietzsche. The text concludes with a bibliography that includes both Nietzsche's *Die Unschuld des Werdens* and *Also sprach Zarathustra* as well as Borges's favorite works in popular science by Bertrand Russell and others like *Introduction to Mathematical Philosophy*, *The ABC of Atoms*, and *The Nature of the Physical World*.

Most critics have read the essay as one of many that explores the nature of infinity, a concept that would occupy a great deal of the Argentine writer's attention throughout his life and that would serve as the central theme for many of his best known stories, including "Las ruinas circulares" and "El jardín de senderos que se bifurcan." In the face of the many critics who have taken the essay as an important articulation of Borges's views on infinity, René De Costa argues that it is a mistake to take the text seriously, especially when attempting to understand the author's take on eternity (35). De Costa is right in identifying the importance of humor in the essay, but such a stance does not preclude the equal importance of understanding the rhetorical operations of Borges's critique of Nietzsche. If he playfully scolds the idea of Eternal Return, the structure of that scolding is tied to a tradition that includes a similar textual disciplining of Juan Manuel Rosas and Facundo Quiroga undertaken by Sarmiento. While we may not have access to Borges's "true" opinions on eternity or entropy, we can appreciate a carefully planned attack on Nietzsche that incorporates elements of a nineteenth-century desire to provide a scientific basis for their writing on both thematic and structural levels.

One strategy that echoes those elements is the positioning of Borges's caricature of Nietzsche against a series of physicists and mathematicians that the Argentine will invoke in his discussion of the concept. Near the beginning of the essay, he immediately turns to Rutherford as a source for his description of the characteristics of atoms:

Antes de refutarlo—empresa de que ignoro si soy capaz—conviene concebir, siquiera de lejos, las sobrehumanas cifras que invoca. Empiezo por el átomo. El diámetro de un átomo de hidrógeno ha sido calculado, salvo error, en un cienmillonésimo de centímetro. Esa vertiginosa pequeñez no quiere decir que sea indivisible: al contrario, Rutherford lo define según la imagen de un sistema solar, hecho por un núcleo central y por un electrón giratorio, cien mil veces menor que el átomo entero. (1: 385)

Borges makes a series of textual gestures that incorporate the cultural authority of science within a playful web of authorial presence and absence. His first declaration not only gently mocks his efforts to discredit Nietzsche's ideas; it also separates the authorial "yo" from the declarations of truth that science will then provide. The descriptions of the atoms are then couched in a scientific mode of expression in which the specificity of the language authorizes the statements Borges includes. He further strengthens the authority of his text with an invocation of Rutherford's definition of atomic structure, again a rhetorical choice that echoes Sarmiento's use of Humboldt. Borges adds a wrinkle to the process by stepping out of the way of the language he introduces, situating the scientific description of atoms as anterior to his own more philosophical refutation of Nietzsche. Still, the deployment of science in the service of his proverbial axe-grinding strengthens the case for the writer's engagement with what can be considered a nineteenth-century aesthetic.

In fact, Borges's disappearing act imitates another aspect of modern scientific discourse. Foucault observed the following about the nature of scientific expression in his well-known essay, "What is an Author?":

A reversal occurred in the seventeenth or eighteenth century. Scientific discourses began to be received for themselves, in the anonymity of an established or always redemonstrable truth; their membership in a systematic ensemble, and not the reference to the individual who produced them, stood as their guarantee. The author function faded away, and the inventor's name served only to christen a theorem, proposition, particular effect, property, body, group of elements, or pathological syndrome. By the same token, literary discourses came to be accepted only when endowed with the author function. We now ask of each poetic or fictional text: From where does it come, who wrote it, when, under what circumstances, or beginning with what design? (*Foucault Reader* 109)

On the one hand, Borges's destabilization of his own "author function" forms part of another fundamental aspect of his work in which he constantly draws into question the way a reader conceives of an author, likely serving as inspiration for Foucault's own musings on the subject.⁶ At the same time,

6. There are several articles that discuss the relationship between Foucault and Borges. See, in this case, Ramos-Tremolada for a consideration of the way in which the two approach the author. See also Ambrose, O'Sullivan, and Ramos Collado.

by claiming to stand apart from the scientific explanation that he proceeds to share, Borges creates a situation that hints at accepted scientific style. Alan Gross has referred to this aspect of scientific expression “an overriding need to privilege an ontology of physical objects” (71). Borges achieves a similar goal by emphasizing the “data” that science provides against Nietzsche as more persuasive than his own personal objections. In addition, Borges tends to use the scientists that he names in much the same manner that Foucault describes: Rutherford functioning as a guarantee of the truthfulness of the atomic theory more than as a discrete individual. In keeping with Foucault’s description of the development of scientific discourse, Borges could be said to outdo his nineteenth-century predecessors like Sarmiento and Lucio Mansilla who tended to create strong authorial persona and then present them as scientists.⁷

Borges’s use of scientific authority in this section of “La doctrina” extends beyond an imitation of scientific style and direct citation. The weight that he creates for his discussion of atoms is one that simultaneously constructs Nietzsche as a theoretician who has not thought through the implications of his theory. Rutherford and the scientific description of atoms discredit Nietzsche by virtue of his ignorance of atomic theory, indeed, by his implicit rejection of it as Borges will later note. In this essay devoted to discrediting a circular notion of time, Nietzsche is characterized as occupying a hopelessly dated point in a linear history of ideas. Science, in its much more contemporary position on that line, simply supersedes his obsolete theories. While the discussion of the immense number of atoms in the universe does not necessarily disprove Nietzsche’s theory, as Borges will later admit, it does suggest that the person who supports it is not considering the immense variety possible in the universe. Borges remarks after discussing the millions of possible combinations of ten atoms: “Si una partícula casi infinitesimal de universo es capaz de esa variedad, poca o ninguna fe debemos prestar a una monotonía del cosmos” (1: 385). The use of the exact terminology that endows his statements with the air of scientific authenticity ends up serving double time as a contrast to a perceived sloppiness in Nietzsche’s postulation. This strategy will then strengthen Borges’s later criticism that Nietzsche fails to acknowledge the long history of Eternal Return in Western philosophy,

7. See González Echeverría and Pratt for more information on this practice in the nineteenth century.

suggesting that the philosopher's intellectual laziness combines an ignorance of science with an unwillingness to acknowledge his philosophical debts.

Borges invests his use of scientific terminology with a playful tone that we saw in his statement of false modesty concerning his ability to refute Nietzsche's ideas. This self-deprecating humor appears again in the same paragraph where he remarks, "Hacer el cómputo de los cambios posibles en ese par de gramos [. . .] es ya una operación muy superior a mi paciencia humana" (1: 385). This slightly mocking tone distances Borges once again from the scientific terminology that accompanies it; indeed, it presents science as beyond his own humble ability. Instead of suggesting that his authorial persona has the ability to function as a scientist (as Sarmiento would), Borges excludes himself from the scientific scene. While these statements of mock humility can be seen to strengthen the attempt to emphasize the data over its human interpreter, as we saw earlier, they also fulfill other functions. His authorial absence from scientific explanation frees him to combine a stylistic deployment of the cultural authority of science with the self-reflexive play and ironic commentary for which the Argentine author is so well known. If Borges will use this strategy to criticize scientific thought severely in later writings like "Tlön, Uqbar, Orbis Tertius," here it enhances science's truth-telling power by protecting it from the mocking overtones of his criticism. If Borges merely serves as witness of scientific theory in an otherwise satirical critique of Nietzsche, he saves science from the effects of that critique. In its somewhat isolated sphere, the scientific discourse at work can continue to operate alongside Borges's corrosive humor as a complementary line of attack.

The rest of the essay continues in the same vein described above. Borges's first refutation of Nietzsche appears in a consideration of Georg Cantor's mathematical descriptions of infinity.⁸ While atomic theory reveals the somewhat dated quality of Nietzsche's thought, it does not, as noted before, disprove the concept under consideration. Borges turns to Cantor for the "proof" needed to discredit Nietzsche's theory completely. In his presentation of the mathematician's set theory Borges returns to a series of linguistic

8. Cantor developed the notion of transfinite numbers as descriptors of infinite sets. Cantor showed that infinite correspondences could be constructed from apparently finite sets, proving, for him, the reality of infinity. For further study into Borges's use of Cantor, see Selnes, also Hernández, Corry, and Merrell. Merrell's discussion of Cantor's theories is especially useful for understanding Borges's use of the mathematician's ideas (60–61).

structures and name-dropping that continue the strategy already seen in his use of Rutherford. He incorporates a series of mathematical formulae as examples of the infinite qualities that Cantor predicted in mathematical sets. Observe the explanation of Cantor's theory, introduced in the paragraph whose first line reads "Cantor destruye el fundamento de la tesis de Nietzsche":

El conjunto de los números naturales es infinito, pero es posible demostrar que son tantos los impares como los pares.

Al	1	corresponde	el	2
"	3	"	"	4
"	5	"	"	6, etcétera. (1: 386)

He follows with two more tables of numerical comparisons, all leading to the conclusion, "Una genial aceptación de estos hechos ha inspirado la fórmula de que una colección infinita—verbigracia, la serie natural de números enteros—es una colección cuyos miembros pueden desdoblarse a su vez en series infinitas" (1: 387). Borges here takes his allusion to scientific style one step further, creating the illusion of a mathematical treatise that proves, objectively, that Cantor does indeed dismantle the basis of Nietzsche's idea.

Borges then continues to incorporate mathematical expression with scientific reference as he strengthens his attack on the German philosopher. Borges's final description of Cantor's theory displays all the aspects of the textual strategy we have discussed:

La serie de los puntos del espacio (o de los instantes del tiempo) no es ordenable así; ningún número tiene un sucesor o un predecesor inmediato. Es como la serie de los quebrados según la magnitud. ¿Qué fracción enumeraremos después de $1/2$? No $51/100$ porque $101/200$ está más cerca; no $101/200$ porque más cerca está $201/400$; no $201/400$ porque más cerca[. . .] Igual sucede con los puntos, según Georg Cantor. Podemos siempre intercalar otros más, un número infinito. Sin embargo, debemos procurar no concebir tamaños decrecientes. Cada punto "ya" es el final de una infinita subdivisión. (1: 387)

Borges's use of fractions here continues his previous use of mathematical forms earlier in his discussion of Cantor that in turn weds Cantor's authority

as mathematician with the theories that Borges advances against Nietzsche. In that sense we have a double privileging of Borges's critique. Cantor's mathematical prestige is enhanced by the mathematical expressions used to illustrate his theories. Nietzsche, however, enjoys neither the scientific status nor the explanatory power of the equations. The essay uses this reinforcing gesture to inscribe a rhetorical space where Cantor and Rutherford are "right" because they are recognized as mathematicians and scientists. Borges, then, is also "right" because he uses their ideas and, just as importantly, their language. Borges ends the section on Cantor stating: "Si el universo consta de un número infinito de términos, es rigurosamente capaz de un número infinito de combinaciones—y la necesidad de un Regreso queda vencida. Queda su mera posibilidad, computable en cero" (1: 387). Borges presents his declaration of victory in a combination of Cantor's authority, mathematical calculation, and disciplinary language. The textual battlefield established by the opening phrase "Cantor destruye" and ended by the phrase "queda vencida" is one configured by mathematics and computation in which Nietzsche's failure is a direct result of his inability to participate in that discourse.

The rather scientific introduction and refutation of Nietzsche's thought gives way in the second section of the essay to a more philosophical and personal evaluation of him, one replete with references to the Bible and quotations from John Stuart Mill, Saint Augustine, and Miguel de Unamuno. The previous section seems to serve as a kind of heavy rhetorical artillery that breaches Nietzsche's philosophical defenses and opens him up to the more personal and less scientific analysis that Borges will perform in the second section. Subsequently, the tone of the essay changes substantially. The new mood is probably best appreciated in Borges's description of the moment Nietzsche proposes Eternal Return:

Nietzsche quería ser Walt Whitman, quería minuciosamente enamorarse de su destino. Siguió un método heroico: desenterró la intolerable hipótesis griega de la eterna repetición y procuró educir de esa pesadilla mental una ocasión de júbilo. Buscó la idea más horrible del universo y la propuso a la delectación de los hombres. El optimista flojo suele imaginar que es nietzscheano; Nietzsche lo enfrenta con los círculos del Eterno Regreso y lo escupe así de su boca. (1: 389)

Borges's personal characterization of Nietzsche's motives contrasts starkly with the more detached style evident in the mathematical and scientific dis-

cussions we saw earlier. At the same time, this change in tone complements his previous strategies. Nietzsche continues to occupy a position anterior to contemporary scientific discovery in the history of ideas constructed in the essay. Borges associates Nietzsche first with the Greeks, then with the Christian God who similarly expels lukewarm believers from his mouth, but not with the scientists of the nineteenth and twentieth century who, according to the essay, disprove his ideas. The references to scientific theory and specific scientists and mathematicians serve a preparatory role, then, outlining a textual field divided between science haves and have-nots. One recalls Sarmiento's statement following his rather lengthy "scientific" taxonomy of the gaucho: "He necesitado andar todo el camino que dejo recorrido para llegar al punto en que nuestro drama comienza" (35). In a similar fashion, Borges uses scientific discourse to set up his much more subjective discussion of Nietzsche.

Borges finishes his refutation of the circular doctrine with a similarly circular spiral in the structure of his essay. In the third part, he returns to another scientific basis for his rejection of Nietzsche's theories. Initially he reaffirms Nietzsche's intellectual position as anterior to scientific discovery by remarking "Tampoco habló—y eso merece destacarse también—de la finitud de los átomos." He then alludes to yet another scientific principle that defeats Nietzsche's ideas. Borges concludes his discussion in the third section of the essay:

Nietzsche recurre a la energía; la segunda ley de la termodinámica declara que hay procesos energéticos que son irreversibles. El calor y la luz no son más que formas de la energía. Basta proyectar una luz sobre una superficie negra para que se convierta en calor. El calor, en cambio, ya no volverá a la forma de luz. Esa comprobación, de aspecto inofensivo o insípido, anula el "laberinto circular" del Eterno Retorno.

La primera ley de la termodinámica declara que la energía del universo es constante: la segunda, que esa energía propende a la incomunicación, al desorden, aunque la cantidad total no decrece. Esa gradual desintegración de las fuerzas que componen el universo, es la entropía. Una vez igualadas las diversas temperaturas, una vez excluida (o compensada) toda acción de un cuerpo sobre otro, el mundo será un fortuito concurso de átomos. En el centro profundo de las estrellas, ese difícil y mortal equilibrio ha sido logrado. A fuerza de intercambios el universo entero lo alcanzará, y estará tibio y muerto. (1: 391)

The passage reactivates many of the strategies already in evidence in Borges's use of Rutherford and Cantor. Nietzsche is again shown as incorrect in his reasoning because he does not have access to scientific fact. In this case, even his arguments about energy are contradicted by the scientific laws of thermodynamics that control the energy Nietzsche had used as evidence for his own argument. It is in this instance especially where we see the disciplinary effect of science in Borges's rhetoric. Nietzsche's thought is shown to be unlawful, that is, in violation of the laws of nature. Science, in this case thermodynamics, appears as an accurate description of the universe whose accuracy endows Borges's critique of Nietzsche with a similar claim to truth. The other textual aspects of this use of science remain constant. Borges continues to deemphasize his own presence as he explains the scientific implications of entropy; personal pronouns and ironic asides, after appearing throughout the second section, have no place in the third. Still free from those intrusions, scientific theory continues to occupy an objective space within the text that authorizes the running critique of Nietzsche's theory. Finally, the specific use of thermodynamics as a concluding argument incorporates the discussion of atoms and their structure that appears at the beginning of the essay, bending the structure of the text into a thematic circle.

The bibliography, with its inclusion of several contemporary popularizations of science, invokes yet again the authority of science. It simultaneously expands the play of authorial absence and presence that we noted earlier. The bibliography creates the impression that the authors/scientists of the books cited are the speakers of the science used in the essay rather than Borges. In a method that reaffirms his obsession with citation and literary allusion, Borges suggests that he merely serves as a purveyor of scientifically valid information. While this practice certainly bolsters his status, it also protects science from the rhetorical attack he unleashes on Nietzsche. At the same time, however, he uses a bibliography of real books in a discussion of a real philosopher. The apparent gravity of the discussion and its citation of science works suggest a point in which Borges took quite seriously the rhetorical power of science. His incorporation of that power within the literary strategies he brings to bear on Nietzsche serves—wittingly or not—as a backwards look towards the nineteenth century.

Lest we take Piglia's comment too much to heart and place Borges firmly in the nineteenth century, we must also recognize that "La doctrina de los ciclos" is more than an argumentative essay against a particular aspect of Nietzsche's philosophy. As noted earlier, Borges structures his consideration

of Nietzsche's cycles in a circular manner, a form that gently ironizes the scientific arguments that he deploys against Nietzsche. For example, the mocking adjective "insípido" appears only twice in the essay, in the first paragraph and then in the last. It first modifies the description of Nietzsche's opening arguments, emphasizing the insipid nature of the initial assumptions of the doctrine. It appears at the end once again, this time qualifying the inevitable implications of the second law of thermodynamics: the final heat death of the universe. The circular structure of the essay, emphasized by the linguistic parallels that Borges introduces through careful word choice, produces a situation in which the two theories that are meant to disprove one another end up as mirror images. That is, the hopelessness of an eternity of Platonic years is, by and large, the hopelessness of the eventual heat death of the universe as predicted by entropy and the laws of thermodynamics; the immobility implicit in an eternal return to the exact configuration of a finite number of atoms is replaced by the immobility of those atoms that have reached the disorder of absolute entropy as Borges understands it.

It is in that final view of science that we see a Borges much more in line with the developments in twentieth-century thought in which a positivistic faith in science was seen to fail spectacularly. If he depends on the truth-telling ability of science to privilege his critique of Nietzsche, he does not champion science as any kind of philosophical or political answer. The temporal sequencing of the history of ideas Borges employs as a part of his attack on Nietzsche, placing the German philosopher before modern science, also reflects on the position of science in Borges's thought. The circular structure of the essay is really more of a downward spiral with the rhetorical victory of science occurring with the descent into the static, dead world that its theories apparently predict. The third section ends in the following manner: "La luz se va perdiendo en calor; el universo minuto por minuto se hace invisible. Se hace más liviano, también. Alguna vez ya no será más que calor: calor equilibrado, inmóvil, igual. Entonces habrá muerto" (1: 391). Borges claimed that Nietzsche meant to expel the silly optimist from his camp with the concept of Eternal Return. Even so, science's defeat of Nietzsche offers no safe haven for the now beleaguered positivist. In "La doctrina de los ciclos," the lack of an eternal return merely means the eventual paralysis of the universe. Borges's final note, an observation that even if Nietzsche is right, it means absolutely "nada" for either practice or the thinker, further strengthens this view. Reality, as science describes it, ends up in the same existential absence of hope implied in an unending repetition of events.

Even in this pessimistic evaluation of science, we continue to see an echo of the practice of the nineteenth century that reverberates in a post-Schopenhauerian world. Here we see modern science used as proof of a negative vision of the world. Science's loss of power to offer hopeful solutions to problems may have disappeared with the decline of positivism, but its inability to do so merely confirms the pessimistic vision that many writers shared during the beginning of the twentieth century.⁹ Science need not offer the constructive answers of the previous century to wield cultural influence or create socially valid truth. Borges's use of scientific reference in "La doctrina de los ciclos" would appear to fit within that practice, where his pessimism is only more profound as a result of its grounding in scientific theory. While the hopeful appreciation of science that was prevalent in nineteenth-century literature has clearly changed profoundly, science's power as a discursive mechanism endures. Science continues as a kind of disciplining mechanism in this case, one that allows and disallows certain modes of thought. In the case of this essay, Nietzsche's thought, and then Nietzsche himself, become unruly bodies subject to the intellectual discipline that science affords. In that sense, the spiral structure of the essay offers a competing interpretation with that afforded by its circularity. The move from objective descriptions of science and mathematics, to a personal description of Nietzsche, back to the impassive language of science creates a situation in which science frames the unlawful subject and where Nietzsche's threatening philosophical position is subjected to the discipline of the scientific ideas that quite literally surround it in the essay. From that perspective, parts one and three can be seen as a kind of textual vice around Nietzsche that results in a kind of execution, present both in the death of his idea as well as the heat death of the universe. In such a tortured setting, Borges's characterization of Nietzsche's proposal as an attempt to describe the "crucifixion" of immortality is completely appropriate if somewhat chilling. The interplay between Nietzsche and discipline traces the circular structure of the essay, the philosopher first appearing as the offending body, then as one that disciplines others (in this case the

9. We see this tendency in writers like Roberto Arlt who used Darwin's theory of natural selection as support for his depiction of a depraved reality in his novel *El juguete rabioso*. Here also we see Borges responding to a twentieth-century enthusiasm for those scientific discoveries that could be seen to upend previous thought. Note Ortiz's description of Einstein's visit to Buenos Aires for a sense of how Argentine intellectuals reacted to these new ideas. Also see Sarlo's characterization of the milieu of early-twentieth-century Buenos Aires that contributed to this sentiment.

optimista flojo), and finally returning to the role of the punished body as his ideas fall under the controlling eye of science once again.

In that image especially we see the extent of Borges's scientific discipline; not only does Borges depend upon science as a discipline, but he also depends on the disciplinary power of science as seen from a Foucauldian perspective. If Borges's later mockery of science's tendency to taxonomy would inspire the basis of Foucault's work, Foucault's discussion of disciplinary discourse provides an effective description of the dynamic between science and text that Borges employs in his attack on Nietzsche. In *Power/Knowledge*, Foucault observed:

Disciplines are the bearers of a discourse, but this cannot be the discourse of right. The discourse of discipline has nothing in common with that of law, rule, or sovereign will. The disciplines may well be the carriers of a discourse that speaks of a rule, but this is not the juridical rule deriving from sovereignty, but a natural rule, a norm. The code they come to define is not that of law but that of normalisation. Their reference is to a theoretical horizon which of necessity has nothing in common with the edifice of right. It is human science which constitutes their domain, and clinical knowledge their jurisprudence. (106–7)

When I speak of Borges's scientific discipline, I am merging the two definitions of discipline that most interest Foucault: discipline as an organization of knowledge and discipline as a castigating mechanism that exerts power over a human body. As Foucault has shown, both in the quotation above and throughout his work, the two are not so different. The normalization that occurs as disciplines decide what is and what is not knowledge is very similar to the discipline that defines bodies as lawful or unlawful and punishes them accordingly.¹⁰ In his literary discussion of Nietzsche, Borges creates a kind of scientific discipline or grouping of discursive norms that uses its ability to produce truth about nature as a way to discipline, or contain, Nietzsche's argument. When he abandons scientific reference to present his conjecture on Nietzsche's personal motives, he transforms a critique of the German philosopher's ideas into a disciplinary action leveled at the man

10. See, of course, Foucault's *Discipline and Punish* and *A History of Sexuality* for his in-depth discussion of this subject.

himself. In that sense, Borges's scientific discipline moves from academic discipline to corporeal punishment. Borges's emphasis on the disciplinary nature of Nietzsche's attack on optimistic appraisals of eternity merely emphasizes the stern rebuke that he administers to the German philosopher's theory as well as the intellectual processes that led to its development. Indeed, so complete is the discipline that when Borges would refer to Nietzsche in "El tiempo circular," he would dismiss him in two sentences, observing, "El segundo [version of the theory] está vinculado a la gloria de Nietzsche, su más patético inventor o divulgador" (1: 393). What is ironic is that the Argentine writer who inspired broad lines of Foucault's inquiry can also be seen to confuse the two disciplines in a way that Foucault himself helps describe.

Still, as we saw in the gentle irony of an essay that uses a circular structure to associate science with the doctrine that it is to have disproved, Borges does not view science as an all-powerful panopticon, and would not maintain even a tempered appreciation of science's cultural authority in his later writing. Eventually, the slightly ironic gaze towards science that we begin to appreciate in "La doctrina de los ciclos" would undermine any more pronounced expression of test tube envy in the work of Borges. One could argue that his tendency to employ mathematical expression as a substitute for language in several of his essays as well as in stories like "La obra de Herbert Quain" or "La biblioteca de Babel," might hint at a continued preference for the objective ability of scientific over literary expression.¹¹ Such a stance would be persuasive in the case of early essays like "La perpetua carrera de Aquiles y la tortuga" where he uses mathematical notation as an explanatory tool that privileges his analysis of Zeno's paradox. Still, the prominent role of science in Borges's discipline of philosophy would not extend through his subsequent work.

Nevertheless, the disciplinary nature of his thought would indeed continue, albeit in the well-identified vein mentioned at the beginning of this essay. Science's persuasive power as applied against philosophy would soon fall to the scrutiny that once employed it. That is, if Borges once employed science as a tool for examining the history of ideas, he soon relegated science itself from the role of rhetorical guarantee to the focus of critical examina-

11. There are several articles dedicated to Borges's use of mathematics in his writing. See Amaral, Merrell, Capobianco, and Corry for more information.

tion. The result would be a series of articles and stories where science's predictive and cultural power would be examined as one of a series of failed attempts to explain an inexplicable universe. In fact, "El tiempo circular," appearing on the heels of "La doctrina de los ciclos," avoids the mention of science completely in its discussion of the same topic. An example of Borges's complete abandonment of scientific discourse as a possible guarantee of textual authority can be found in the article that inspired Foucault's *The Order of Things*, "El idioma analítico de John Wilkins," from *Otras inquisiciones*. In the article, Borges comments, "he registrado las arbitrariedades de Wilkins, del desconocido (o apócrifo) enciclopedista chino y del Instituto Bibliográfico de Bruselas; notoriamente no hay clasificación del universo que no sea arbitraria y conjetural. La razón es muy simple: no sabemos qué cosa es el universo" (2: 86). If Borges's condemnation of Nietzsche depended in part on thermodynamics providing an accurate description of the universe, the taxonomical project that has occupied center stage throughout much of the history of science is now an abject failure. Indeed, Borges's ability to reveal the inherently arbitrary nature of taxonomic schemes was what gave Foucault so much food for thought. Borges's stories would also develop this theme, from "Tlön, Uqbar, Orbis Tertius," where scientists and science are shown to be in the service of dark geniuses who threaten the stability of the Earth, to the merely irrelevant anthropologists that populate his later story "El etnógrafo." Even so, the explicit appearance of scientific reference would mainly disappear from Borges's work aside from the occasional use of a mathematical formula. One could certainly conclude that if Borges once suffered from a nineteenth-century case of "test tube envy," the time he would spend on the literary couch would finally cure him of his malady.

Still, Borges's early use of scientific name-dropping and a recursion to scientific discourse in "La doctrina de los ciclos" adds weight to Piglia's claim that he was Argentina's best writer of the nineteenth century. While Sarmiento's dispute with Rosas would have farther-reaching ramifications for Argentina than Borges's criticism of Nietzsche, the rhetorical strategies that undermined their textual confrontations share a common bond in scientific discourse. In a sense, Borges has merely exchanged Humboldt for Cantor, phrenology for thermodynamics in a show of textual discipline that learns a great deal from his nineteenth-century forebears. Of course, the power of Piglia's claim results from the way it challenges popular conceptions of Borges as a leading writer of the twentieth century, not only in Argentina but also throughout the Western world. Nor can we deny the profound impact

Borges has exercised on twentieth-century thought, especially in regard to his system-challenging skepticism regarding philosophy and science. Furthermore, most criticism that has considered the connections between Borges and science focuses on his anticipation of developments in quantum mechanics or his sophisticated use of the concepts of chaos theory, fractals, and other twentieth-century scientific discoveries.¹² It is a tribute to the richness of Borges's work to discover that, among all of his twentieth-century trappings, we find the echoes of Sarmiento. Not only do the gauchos and the Europhiles that made such an uncomfortable marriage in the nineteenth century continue their rocky relationship in Borges's work, the test-tube envy that mediated their association in Sarmiento's writing continues to echo through the twentieth century.

Works Cited

- Amaral, Pedro. "Borges, Babel y las Matemáticas." *Revista Iberoamericana* 37 (1971): 421–28.
- Ambrose, Timothy. "Borges, Foucault y Derrida: la disolución de límites y la creación del texto. Una interpretación védica." *La Torre* 9.34 (1995): 147–66.
- Arlt, Roberto. *El juguete rabioso*. Buenos Aires: Editorial Latina, 1926.
- Barrenchea, Ana María. *La expresión de la irrealidad en la obra de Jorge Luis Borges y otros ensayos*. Buenos Aires: Ediciones del Cífrado, 2000.
- Borges, Jorge Luis. *Obras completas*. 4 vols. Buenos Aires: Emecé, 1996.
- Brandão Tiago de Oliveira, José Carlos. "Borges, O Matemático." *Ometeca* 1.1 (1989): 53–61.
- Brown, J. Andrew. "Chaos in the Chaco: Ilya Prigogine and Mempo Giardinelli's *Imposible equilibrio*." *Latin American Literary Review* 31.61 (2003): 23–40.
- Bunge, Mario. "Borges y Einstein, o la fantasía en arte y en ciencia." *Revista de Occidente* 73 (1987): 45–62.
- Capobianco, Michael. "Mathematics in the *Ficciones* of Jorge Luis Borges." *International Fiction Review* 9.1 (1982): 51–54.
- Corry, Leo. "Algunas ideas científicas en la obra de Borges y su contexto histórico." 3 Sept. 2004. <<http://www.tau.ac.il/~corry/texts/chapters/borges-ciencia.pdf>>.
- De Costa, René. *El humor en Borges*. Madrid: Cátedra, 1999.
- Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences*. New York: Vintage, 1990.
- . *The Foucault Reader*. Ed. Paul Rabinow. New York: Pantheon, 1984.

12. See Hayles, Merrel, Weissert, and Rivero-Potter among nearly a score of books and articles.

- . *Power/Knowledge: Selected Interviews & Other Writings 1972–1977*. Ed. Colin Gordon. New York: Pantheon, 1980.
- González Echevarría, Roberto. *Myth and Archive: A Theory of Latin American Narrative*. Cambridge: Cambridge UP, 1990.
- Gross, Alan. *The Rhetoric of Science*. Cambridge: Harvard UP, 1996.
- Halpern, Paul. "Borges, Nietzsche, and Poincaré Recurrence." *Ometeca* 2.2 (1991): 71–77.
- Hayles, N. Katherine. *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century*. Ithaca: Cornell UP, 1984.
- Hernández, Juan Antonio. "Biografía del infinito: la noción de transfinitud en Georg Cantor y su presencia en la prosa de Jorge Luis Borges." *Signos literarios y lingüísticos* 2.2 (2000): 131–39.
- Merrell, Floyd. *Unthinking Thinking: Jorge Luis Borges, Mathematics and the New Physics*. West Lafayette: Purdue UP, 1991.
- Ortiz, Eduardo L. "The Transmission of Science from Europe to Argentina and its Impact on Literature: From Lugones to Borges." *Borges and Europe Revisited*. Ed. Evelyn Fishburn. London: London UP, 1998. 108–23.
- O'Sullivan, Gerry. "The Library Is on Fire: Intertextuality in Borges and Foucault." *Borges and His Successors: The Borgesian Impact on Literature and the Arts*. Ed. Edna Aizenberg. Columbia: U of Missouri P, 1990.
- Piglia, Ricardo. *Respiración artificial*. Barcelona: Editorial Anagrama, 2001.
- Pratt, Mary Louise. *Imperial Eyes: Travel Writing and Transculturation*. London: Routledge, 1992.
- Ramos Collado, Lilliana. "Proyectos infames: breve genealogía borgeana de un ensayo de Foucault." *Nómada* 2 (1995): 69–80.
- Ramos-Tremolada, R. "La morada del poeta: apuntes sobre la muerte del autor." *La Torre* 9.34 (1995): 349–65.
- Rivero Potter, Alicia. *Autor/lector: Huidobro, Borges, Fuentes y Sarduy*. Detroit: Wayne State UP, 1991.
- Sarlo, Beatriz. *Borges: un escritor en las orillas*. Buenos Aires: Ariel, 1995.
- Sarmiento, Domingo. *Facundo. Civilización y barbarie, vida de Juan Facundo Quiroga*. 1845. México, D.F.: Porrúa, 1991.
- Selnes, Gisle. "Borges, Nietzsche, Cantor: Narratives of Influence." *Ciberletras* 6 (2002). 3 Sept. 2004. <<http://www.lehman.cuny.edu/faculty/guinazu/ciberletras/>>.
- Shaw, Donald. *Borges, Ficciones*. London: Támesis, 1976.
- Silva Gruesz, Kirsten. "Facing the Nation: The Organic Life of 'La cautiva.'" *Revista de Estudios Hispánicos* 30.1 (1996): 3–22.
- Weissert, Thomas P. "Representation and Bifurcation: Borges's Garden of Chaos Dynamics." *Chaos and Order: Complex Dynamics in Literature and Science*. Ed. N. Katherine Hayles. Chicago: U Chicago P, 1991. 223–43.

