The unnatural realism of Borges

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The Unnatural Realism of Borges

**HONG YUCHEN
SCHOOL OF HUMANITIES
2020**

The Unnatural Realism of Borges

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School of Humanities

A thesis submitted to the Nanyang Technological University
in partial fulfilment of the requirement for the degree of
Master of Arts

2020

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SUMMARY

Critics of Borges's short stories have mostly pointed towards the writer's predisposition towards creating complex, labyrinthine worlds; such a view has grounded him firmly as a writer of magic realism or an early postmodernist. A smaller subset of critics has pointed out the coincidence of his stories with 20th century scientific concepts, and that his fictions relate in a meaningful and even technical way to reality. I argue that both sides of the critical spectrum surrounding Borges are equally valid – and that, given the shocking nature of some of the 20th century's most important scientific revelations that betray the labyrinthine and indeterminate nature of reality, I contemplate whether or not Borges's stories are instead a form of *realism*, albeit a particularly avant-garde one. I propose that Borges's short stories also function as serious thought experiments that illustrate the counter-intuitive nature of the reality that we see and interact with on an everyday basis. He points out, within his fiction, that the natural and the *unnatural* are really two sides of the same coin. My thesis provides an account of Borges's narrative method using the term “unnatural realism,” in order to justify the writer's attempt to embody reality in a way that does justice to 20th century science – which ironically involves the use of intricate labyrinths and logical paradoxes, techniques that fall under the category of unnatural narrative.

We (the undivided divinity operating within us) have dreamt the world. We have dreamt it as firm, mysterious, visible, ubiquitous in space and durable in time; but in its architecture we have allowed tenuous and eternal crevices of unreason which tell us it is false.

Borges, "Avatars of the Tortoise"

Chapter 1: Introduction

The 20th Century and a New Reality

Sylvia Molloy begins her book *Signs of Borges* with the observation that "To read Borges, to consume a predictable Borges who no longer surprises us, has become a habit. By common accord, it would seem, readers of Borges, with the collaboration perhaps of the author himself, have turned an unstable text into a solid monument" (1). Molloy means to say that, over the course of some half a century of critical discourse, critics have learned to respond reflexively to now-familiar Borgesian tropes. The Argentinian writer has, over the course of his lifetime and beyond, accrued a range of labels and personas: postmodern writer, magical realist, philosopher, political commentator – the word *Borgesian*, Molloy notes, has been appropriated by critics to subsume all of these diverse aspects of the writer under a single, convenient umbrella (2), to the detriment of the subtle nuances that each aspect holds.¹ Quite contrary to Molloy's claim, however, Borges has only become *more* difficult to read, not less, with each sedimentary addition to the existing critical bedrock. This is especially so if we trace the genealogy of

¹ In making this statement, I consider the following works: Lisa Block de Behar's book *Borges: The Passion of an Endless Quotation*, which focuses on his employment of intertextuality; Maria Díaz Pozueta's essay "From Philosophical Idealism to Political Ideology in 'Tlön, Uqbar, Orbis Tertius' and 'Deutsches Requiem'"; and of course, Molloy's own *Signs of Borges*, which deals with the disquietude that Borges invokes in the reader.

Borges's meticulously constructed labyrinths not only to developments in literary techniques and theory but also to advances in 20th century science, the sheer strangeness of which exerted a profound impact on our philosophical apprehension of the world. In this particular area of critical conversation – between the sciences, philosophy, and the literary arts – Borges continues to surprise us, and will likely keep doing so for quite some time, as scientific research continues its forward march. This is because, as strange and inhospitable as Borges's worlds may initially seem, they continue to find resonances in fields such as quantum physics, chaos theory, and special relativity.

Although Borges was first and foremost a writer, not a scientist, to suggest that he has had an affinity with science is not in itself a fresh critical endeavor. His short stories have gone so far as to attract the attention of critics whose expertise lie beyond the literary sphere – we need look no further than the work of William Goldbloom Bloch, a professor of mathematics who has written a book about the mathematical subtleties embedded within “The Library of Babel,” and Thomas P. Weissert, a systems dynamicist who saw similarities between “The Garden of Forking Paths” and bifurcation theory. As these relatively recent scholarly works indicate, the scientific elements within Borges have been demonstrated to be tangible, and above all, *traceable* to some known mathematical principle or scientific theory. But to some degree, the question persists: how and where do we locate the poetics and, more critically, the physics of Borges? How do the labyrinths, deliberate textual fissures, and overt logical paradoxes fit in within the fields of science and mathematics, whose central quest appear to be the search for certainty – for a final and ultimately reliable way of ordering the world?

The answer to this is that the definition of certainty appears to have somewhat shifted over the course of 20th century scientific developments – if the 19th century was the heyday of

Newtonian certainty, then the 20th century was the era of postmodern doubt for both the sciences and the humanities. The new fields of relativity, quantum mechanics and chaos theory came together to undermine the legitimacy of Newtonian physics as the dominant model of reality.² With them, the optimism towards the ability of science to provide a quantifiable account of the world was irreversibly shattered. Special relativity dismissed the notion of an absolute, universal time: two events happening “simultaneously” in two points in space will appear to have happened at different times to an observer positioned between them. Quantum mechanics revealed the bizarre behavior of physics at small scales – a particle, for instance, exists simultaneously in multiple possible states until an observer interacts with it. And finally, chaos theory documented the mechanics of complex systems in everyday life, and indicated that predictive models of such systems fail because of the cumulative effects of small errors.

Reality itself appeared to be breaking free of its Newtonian shackles. In a retrospective glance towards the history of science, one might be tempted towards the conclusion that the quest for certainty has been abandoned, as any description of the world must also account for its intrinsic haziness. A similar development was also occurring in mathematics, which Floyd Merrell describes succinctly in his book *Unthinking Thinking*:

At the turn of the century, Hilbert and other mathematicians envisioned a total axiomization of mathematics by which proof of consistency of any and all mathematical systems could be realized. Such quests for the absolute came to an abrupt halt, however, when in 1931 Kurt Gödel published his earthshaking and in many circles unwanted theorems in “On Formally Undecidable Propositions of *Principia Mathematica* and

² Although almost a cliché at this point, it bears mentioning Einstein’s famous quote expressing his bewilderment at quantum mechanics: “(God) does not play dice with the universe.” This quote is often misinterpreted – Einstein was not attempting to make any sort of religious statement, but he *was* trying to express his disinclination towards quantum theory.

Related Systems.” Gödel demonstrated that, given any logico-mathematical system strong enough to express the arithmetic of natural numbers, either (1) the ultimate truth-value of the formal system cannot be determined from its own set of axioms (the “incompleteness principle”) or (2) the system cannot be totally free of hidden contradictions (the “inconsistency principle”). (Merrell 67)³

Gödel’s two principles reveal that all mathematical systems possess an upper epistemological boundary: no one system can simultaneously describe the world while also confirming its own validity within it. Mathematics, and by extension logic, was seen to be a field capable of making truth-statements about the world – this status, in the wake of what Merrell called the “Gödelian crisis,” seemed to have been permanently revoked.

But the quest for certainty has not been entirely abolished – it carries on, albeit in a slightly different trajectory. The sciences needed a way to express uncertainty in *certain* terms, for some of the century’s most important findings have required the grasping of decidedly alien concepts, such as a particle simultaneously having two contrasting modes of existence in quantum physics (as both a particle and a wave), or the hypothesis that multiple eventualities can exist in a state of superposition as long as they remain unverified by an external observer. Thus, scientists themselves have had to turn to narrative to account for extreme scenarios where the rules of cause and effect are complexified: for instance, Erwin Schrödinger’s famous thought experiment addressing the counter-intuitive nature of quantum superposition comprises a narrative of a cat in a box with a vial of poison. Because the release of the poison is dictated by chance – so the hypothesis goes – the cat remains in a “superposed state” of being

³ Merrell’s work, written in 1991, represents a major sustained engagement with the scientific principles in Borges’s work – perhaps the only book-length example of its kind. I adopt his core idea – that Borges was deliberate and well-informed when making scientific references – for the direction of my thesis, although there are important differences in how I provide a narratological account of the science in Borges.

simultaneously dead and alive as long as the box is unopened and the internal events unverified.⁴ In the instance where the experimenter decides to check inside the box, his very act of “checking” causes the cat to fall into a categorical state of being either dead or alive. This narrative account of quantum mechanics creates a storyworld involving a cat (the subject), the laws of chance and quantum mechanics, a hypothetical experimenter, and presupposes that all of them can and will interact with one another.⁵ Like Zeno’s literally and figuratively timeless paradox of Achilles’s race with the Tortoise, it seems as though physicists have increasingly resorted to meticulously crafted thought experiments, in addition to practical ones, to illustrate discoveries about reality that fall ever more afoul of the linear flow of logic. In fact, Dorrit Cohn notes that “In commentaries on science, social thought, and psychology, one finds *fiction* designating a wide variety of explanatory notions – Newton’s gravitational force (which he himself called ‘a fiction’), Rousseau’s state of nature, Goethe’s original plant (*Urpflanze*), Freud’s unconscious” (Cohn 4, italics and parentheses original). The 20th century not only marked a change in the fundamental principles of physics, but also saw a *creative* turn towards fictionality in the language used to describe them.

What has this all to do with the fictional worlds of Borges? The intersections between Borges’s works and the history of science are in fact several. For one, he was, like a scientist, an astute observer of the world – several of his stories contain concepts that coincide with their official formulation within the language of the sciences, and in certain cases even precede them.

⁴ As long as the observer never “observes” what has gone on within the box, the probability that the cat being dead and the cat being alive are equal, causing these possibilities to coexist in superposition; according to quantum mechanics, once the box is opened and its events are confirmed, a phenomenon known as a “wave function collapse” happens, where all possibilities settle down into one: the cat is *either* alive or dead, but not both.

⁵ For a detailed account of the sparse, but nonetheless existent, narrative elements of Schrödinger’s cat, see Marie-Laure Ryan’s essay, “Narrative/Science Entanglements: On the Thousand and One Literary Lives of Schrödinger’s Cat.”

Borges was an intuitive thinker, and the single great achievement of his art form was his keen ability to intuit certain curious properties of reality even without rigorous scientific or mathematical training. Just as how he was able to intuit unusual literary symbols based on his progressive blindness later on in his career, he proved himself more than capable of creating intricate narrative mechanisms to describe these strange elements of reality. The worlds of Borges, thus, may be regarded as meaningful extensions of our own, with all the attendant logic and limitations, albeit with some parameters emphasized to illustrate just how cognitively untenable certain physical laws become when taken to their logical extreme. In this sense, quite a few of his short stories take on properties akin to Schrödinger's fable of the cat, in that they are also thought experiments: serious ruminations on diverse but fundamental ideas such as the various conceptualizations of time, the effects of chaotic elements in a deterministic universe, or the difficulty of situating infinity within a seemingly finite world. Often, these meticulously devised puzzles are taken by critics as symbols that point towards a deeper meaning; I am more inclined, however, to think that Borges's puzzles are mechanically, rather than symbolically, meaningful – they serve as a means to *embody* the workings of a particular scientific or mathematical concept. Donald Shaw, an advocate of a more systematic and structural way of reading Borges, suggests that focusing on Borges's technique, on how the various parts of a story relate to one another, is just as important, if not more so, than a pure interpretation of meaning. While Shaw does not directly relate Borges's puzzles to science, the rigorous structural framework with which he approaches each short story serves as a useful point of departure to making sense of the mechanical similarities between the stories and the scientific concepts they parallel.

An important distinction should be drawn between some of the more intricate narratives of Borges and magic realism. Even though a magic realist story takes place within a largely realistic setting, they depict “nonempirically verifiable phenomena” (Faris 143) that are fantastic or supernatural, or which otherwise transgress the laws of physics.⁶ Fantastic phenomena are used in magic realism to evoke a “deconstructive effect,” wherein “[f]airy tale and realism confront each other, render each other merely provisional, and reveal each other’s relativity” (Gregson 76) – in other words, they blur the boundaries between fiction and reality in order to demonstrate skepticism towards fixed systems of belief.⁷ While Borges has been credited with “Initiating the Latin American (magic realist) boom” (Faris 145) alongside other Latin American authors, magical realism as form is insufficient in properly accounting for Borges’s narrative method. I suggest that the seemingly fantastic elements in Borges do not attempt to deconstruct actual scientific or mathematical systems – instead, they direct the reader towards the recognition that what has earlier been regarded as fantastic now permeates reality, and what would have been unthinkable in the Newtonian era has now become commonplace in 20th century physics. Indeed, as Bloch demonstrates, concepts in a Borges story are not so much symbols of their mathematical or scientific counterparts as they are direct transpositions, as shown by how easily the topology of “The Library of Babel” can be described by mathematical notation. We see that the bifurcating and overlapping realities described by Albert in “The Garden of Forking Paths” echo Hugh Everett’s Many-Worlds Interpretation of quantum mechanics, which describes a non-paradoxical approach to quantum problems; while the titular Lottery in “The Lottery in Babylon” begins as a seemingly innocuous game of chance but

⁶ These phenomena, Faris notes, are regarded as part of fantasy or the supernatural largely because of the cultural contexts in which magical realist stories are written. Magic realism may draw upon “ancient indigenous beliefs” (145), “mythical figures” or “history” (147).

⁷ See Ian Gregson’s “Introduction” in his book *Postmodern Literature* for a contextual analysis on the attitudes towards fixed belief systems in postmodernism.

eventually supplants the laws of reality itself in a domino-like sequence of events that bears resemblance to the rapid proliferation of chaos in a complex systems. Collectively, these narratives indicate an early realization on the part of Borges that reality contains elements of unimaginable strangeness *while remaining entirely empirical and even measurable* – and that the writer, just as much as the scientist, is equipped with the vocabulary to express it.

Borges's Narrative Stance vis-à-vis Reality

The above examples suggest that Borges's scientifically oriented short stories operate using a unique type of narrative structure that has been implicitly foregrounded by critical commentary but never quite been stated in more precise terms. There are two elements at work in tandem in these stories: the unnatural element, and the realist element. These two seemingly contradictory aspects work together in order to create a fictional framework in which counter-intuitive concepts in reality may be embodied – as Allene M. Parker points out, the effectiveness of Borges's narrative method “depends on a combination of precise details that appear to match our sense of what is real juxtaposed with elements of the unreal or impossible” (Parker 13). Thus, a considerable number of Borges's stories possess a dual identity: on the one hand, they are fantastical and often involve an otherworldly setting; on the other hand, they are also about reality, in the same way that Schrödinger's cat is about reality. Like the duality of particles – a similarity which is entirely coincidental – the scientific elements found in a Borges story can be unnatural and realistic at the same time, proving that these two terms need not be mutually exclusive.

Shaw suggests in his conclusion to *Borges' Narrative Strategy* that it is excessively reductive to read the writer's stories as "independent of the outside world, a closed realm unconnected with anything but itself" (Shaw 178); to do so would be to deprive them of their full and intended value. The inclination to read Borges's works as isolated art objects depicting self-contained worlds with no relation to our own is tempting, especially when they are placed, somewhat erroneously, alongside the multitude of postmodern works that make a claim to such a stance. Shaw recognizes the genuine value of Borges's art when he says that

Because they cannot know the ultimate nature of reality or 'penetrate the divine scheme of the universe', writers are not necessarily precluded from writing about reality *as if* it were partially comprehensible. Nor does it follow that, because the relation between the signifier and signified is arbitrary, writers cannot assume a certain consensus among speakers and readers of a given tongue which allows some sort of meaningful communication about the outside world. (Shaw 178, italics original)

Shaw's statement of the role of the writer in relation to reality comes at a convenient time – the aforementioned narrative trend in the sciences means that at least at a linguistic level, scientists and writers now often find themselves using a common symbolic language when describing the world, even if their starting points and ultimate objectives remain different. And it also happens that Borges, master of the strange and unnatural as it were, proceeds successfully to sketch a more unsettling, but no less real, picture of reality than most thought experiments – bound by the constraints of academic language – have been allowed to achieve.

In order to provide a more nuanced context in which unnatural narratives are situated in relation to both the sciences and to Borges, it may be useful to provide a critical definition on what constitutes the unnatural and how, in a strange turn of events, the unnatural is used by both

the arts and the sciences to describe the natural. In his recent study on unnatural narratives, Jan Alber provides the following definition:

...[In] my usage the term *unnatural* denotes physically, logically, and humanly impossible scenarios and events. That is to say, the represented scenarios and events have to be impossible given the known laws governing the physical world, accepted principles of logic (such as the principle of noncontradiction), or standard anthropomorphic limitations of knowledge and ability. (Alber 25, italics original)

Alber's monograph is at once broad and penetrating, and provides a comprehensive taxonomy of unnatural narratives – so long as it is limited to within literature. I suggest that it is useful to broaden the examination of unnatural narratives to include those produced by scientific discourse, since our current physics relies increasingly upon strange storyworlds to exemplify and describe equally strange natural phenomena. And when we do broaden our classification in this manner, Alber's definition holds up a little less evenly. For it is now difficult to demarcate what is currently possible “given the known laws governing the physical world,” and even ideas such as “noncontradiction” have been put to the test in the past.⁸ He states that “postmodernist narratives have a tendency to first invoke and then explicitly transgress realist expectations” to achieve an effect of defamiliarization in an otherwise familiar context (Alber 225). This statement holds true for Borges, although defamiliarization in Borges's stories works not to subvert reality, but to point towards and affirm the immortal presence of reality's most puzzling enigmas.

Borges has, over the course of his career, demonstrated a profound interest in logical puzzles. In the essay “The Perpetual Race of Achilles,” he mounts an admirable (if ultimately

⁸ Consider the “double-slit experiment,” in which a particle of light is proven to exhibit both particle-like and wavelike properties. It seems to me that the experimenters have jumped through numerous hoops to get a particle to behave in such a manner, but the result is something so mind-numbing as to require various interpretations. Interestingly, the experiment was first conducted 1801 by Thomas Young.

fallacious) defense of Zeno's paradox, which demonstrates the seeming indivisibility of time; in "The Total Library," he alludes to the thought experiment that "a half-dozen monkeys provided with typewriters would, in a few eternities, produce all the books in the British Museum" (Borges 215). He was not only interested in these puzzles from a philosophical standpoint; instead, as the analysis he made in "The Total Library" demonstrates, he was also interested in how these thought experiments were invented, imagined, and eventually related to reality:

One of the habits of the mind is the invention of horrible imaginings. The mind has invented Hell, it has invented predestination to Hell, it has imagined the Platonic ideas, the chimera, the sphinx, abnormal transfinite numbers (whose parts are no smaller than the whole) ...I have tried to rescue from oblivion a subaltern horror: the vast, contradictory Library, whose vertical wildernesses of books run the incessant risk of changing into others that affirm, deny, and confuse everything like a delirious god. (216)

He refers here, no doubt, to an early conception of the ideas behind "The Library of Babel," which would eventually be published in *The Garden of Forking Paths* in 1944. But what interests us here are the implications behind this final paragraph, which might shed some light on how Borges's narrative method developed. He hints that certain types of thought experiments brim over their fictional boundaries and contaminate our appraisal of what is "natural" forever. Many Borges stories, especially those which contain scientific and logical elements, seek to achieve this ideal by operating as extended metaphors about reality and its inherent paradoxes and conundrums. Because reality is so treacherous and complex that it thwarts the most ingenious and meticulously prepared practical experiments, fiction then becomes a viable alternative laboratory to access the deepest regions of reality from which practical experiments have been barred from entry.

As suggested by Brian Richardson, unnatural narratives can “challenge all conventional boundaries, including foundational ones like the fiction/nonfiction distinction” (Richardson 67) – by extension, it is not inconceivable for thought experiments to fall into the class which Richardson calls “unnatural nonfiction” (67). I do not imply, however, that the short stories of Borges encroach in any way upon the nonfictional domain. Their artistic significance lies in their ability to provide a meaningful inflection of scientific concepts in a way that only fiction can achieve. This is done through the use of characters and narrators – techniques specific to fiction – which lend an *experiential* human element to what might otherwise be yet another thought experiment of a more technical variety. For instance, what debilitating effects do an infinite amount of time exact upon the psyche of an immortal? How does a man speak of an omnipresent lottery that affects and distorts reality itself, when he is but one of its complicit elements? What despair grips the soul of a librarian who has spent his life trawling an infinite library for a book which justifies the library’s existence?

When narratorial stances are taken into account, the story as thought experiment transcends the boundaries of an academic exercise and provokes a contemplative and emotional response on the part of the reader in relation to reality’s numerous curiosities. This is largely due to the nature of Borges’s narrators, whose “posture is that of a non-omniscient teller of the tale, who often concedes that his account may have been affected by time, lapses of memory, incomplete information or subjective reactions” (Shaw 129). In other words, the narrator is often as bewildered by the events of the storyworld as the reader himself. This identification between narrator and reader serves a twofold purpose: first, the reader understands that the narrator possesses a similar set of beliefs, assumptions, and knowledge systems of understanding reality as the reader, thus creating a commonality between a fictional realm and our own; second, based

on this commonality, the narrator's subsequent doubt or bewilderment then invites the reader to consider if such apparently unnatural phenomena as depicted in the storyworlds might plausibly exist in reality. Many of Borges's "what-if" stories may be accounted for by his careful manipulation of a reader's existing assumptions regarding reality, and then gradually undermining them.

All this would be impressive enough already, if Borges merely meant to destabilize our notion of what is real and what is not. But the impact of the text is doubly magnified when the savvy reader, after careful consideration of textual evidence and their parallels with reality, discovers that what initially appear as fictive constructs are actually mathematical or scientifically describable phenomena. In Chapter 2, I analyze the presence of chaos mechanics in two of Borges's short stories, "The Library of Babel" and "The Lottery in Babylon." Not only do I provide an account of entropy in "The Library of Babel" and sensitive dependence on initial conditions in "The Lottery in Babylon," I also an analysis of *what it is like* to exist in such strange worlds that contain extreme versions of natural phenomena. I suggest here that Borges's stories function not only as logical thought experiments, similar to Schrödinger's cat, Zeno's paradox, or Laplace's demon, but also as fully developed psychological ones. The concept of "unnatural realism" will be a dominant theme in this chapter, as Borges artfully demonstrates the seemingly problematic and unnatural elements underpinning what we often take to be *real*, such as omnipresence of chance or the idea of an infinite universe.

In Chapter 3, I will consider the different conceptions of infinity and how even *thinking* about the experience of infinity might lead readers into a recursive psychological loop. Infinity in Borges is often linked to cyclical repetition, or instances of self-similarity: we see this happening in "The Library of Babel" and "The Immortal" – the latter of which seemingly demonstrates

Nietzsche's idea of the Eternal Recurrence. My reading of "The Immortal" necessarily takes into account Borges's attack on Nietzsche in his essay "The Doctrine of Cycles," which calls into question the validity of the narrator's description of immortality. I also analyze Borges's representation of "infinity by division," wherein an infinite number of subdivisions lie between two adjacent points. We see this concept arise in "The Book of Sand" and "The Secret Miracle" – the last of which serves as an effective counterargument to Zeno's paradox of time. Taken altogether, Borges shows us through these stories that the nature of infinity remains endlessly debatable, whether in mathematics, physics, logic or philosophy.

In Chapter 4, I attend to the 20th century physics problem of simultaneity and superposition, and the presentation of these problems in Borges's stories. I first discuss what many critics consider to be the prime symbols of the "thing that represents all things" – namely, the Zahir and the Aleph in the stories of the same names. A symbolic analysis of these two objects reveals that simultaneity is a fundamentally unnatural concept for the human mind, simply because it does not comply with the conventional flow of logic. Which is why, when confronted by it in physics, explanations often tend towards *naturalizing* simultaneity and superposition. I then posit "The Garden of Forking Paths" as analogous to Hugh Everett's Many Worlds interpretation of quantum mechanics, as one such example of an attempt to naturalize simultaneity and remove the attendant logical problems.⁹ There is an early intimation here that science occasionally rationalizes reality in terms of human logic, which may run counter to empirical observation.

Chapter 5 recognizes that "unnatural realism" can only take us so far in considering the larger scheme of Borges's work – instead, I will step back and acknowledge that it is usually the

⁹ Thomas P. Weissert suggests that "The Garden of Forking Paths" is similar instead to bifurcation theory, an aspect of chaos – while his essay is compelling, I beg to differ with my own interpretation.

more fantastical elements that comment adequately on the philosophy of the sciences. Here, the argument leans towards the metaphysical rather than the physical – I argue that symbolic elements embedded within “Tlön, Uqbar, Orbis Tertius” and “Death and the Compass” echo known and sometimes troubling trends in the sciences as an endeavor of knowledge creation. I move on from scientific concepts to the philosophy of science, and I argue that Borges provides a thinly-veiled commentary on the reliance of science on dogma. In this chapter I will introduce observations made by prominent philosophers, such as Thomas Kuhn and Jean-François Lyotard, and how they relate to Borges’s worldview.

Oftentimes, it is unnecessary to place additional emphasis on what is particularly “unnatural” about Borges’s stories; this element of his fiction is usually quite self-evident. However, it is worth bearing in mind that the stories I will proceed to analyze constitute some form of actual insight into the natural world, however strange they may seem – the subtext being that reality is, or *was*, itself unnatural. In the 1940s, when the bulk of Borges’s most complex stories were written, such as those found in the collections *Fictions* and *The Aleph*, the scientists of his time were still coming to terms with what were evidently unnatural empirical observations – of note were the observations concerning the curvature of space-time continuum in special relativity and the seemingly paradoxical behavior of particles under observation in quantum physics. These observations were as “unnatural” to scientists back in the 1940s as they were to the most avant-garde of writers; to some degree, even in 2019, mainstream science has only begun to truly refine its language regarding concepts that have once been extremely difficult to explain to the lay person.¹⁰ Certainly, given sufficient time, what has been at the first glance regarded as unnatural becomes naturalized over time, as new ways of rationalizing these

¹⁰ At certain points in this thesis, I will provide contemporary examples to show how current explanations or phraseology account for such phenomena.

phenomena are uncovered or developed by scientists. Therefore, Borges's unnatural realism is a technique that is mired in a specific point in time, and in a particular social context. Such an idea about the unnatural – that it can be temporally specific – renders Alber's statement that "the unnatural denotes physically, logically, and humanly impossible scenarios and events" a fleeting observation at best. New impossibilities are always being discovered, tested, and puzzled over by science. Nonetheless, even if Borges's strange worlds may no longer quite possess their original aura of strangeness for a 21st century audience, his radical inventiveness during his time allowed him to see the unnatural aspects of reality ahead of certain scientific disciplines. This radical disposition of Borges is something I will refer to throughout this thesis.

I agree with Shaw's statement that, in the final analysis, it is "not really possible to produce a 'grammar' of Borges' narratology" (180). Rather, what might more reasonably be accomplished is a thorough analysis of how certain narrative elements are emphasized or scaled back in degrees to achieve a certain kind of meaning, be it a representation of physical systems or a commentary on the human endeavor for knowledge.¹¹ If we attend to "unnaturalness" and "realism" as two variables that might be turned up or down, so to speak, we might arrive at a more nuanced understanding of how Borges creates thought experiments that guide a reader towards an apprehension of the unnatural within the realistic.

¹¹ This calls to mind Wendy B. Faris's explanation of the phenomenon of magical realism: "In the end, however, given the great diversity among magical realist texts, what often divides one of them from either realism or fantasy is simply the amount of magic: too much magic, and it tips over into fantasy; no actual or too little magic, and it remains realism" (144). By the same principle, I argue, Borges straddles the unnatural and the realistic very carefully, while fine-tuning one or the other to create certain effects.

The most passionate advocates of the new science go so far as to say that twentieth-century science will be remembered for just three things: relativity, quantum mechanics, and chaos.

Gleick 5-6

Chapter 2: The Narrative Dynamics of Chaos

The term “chaos” has had a rich, if somewhat confused, history across the development of the sciences. The usage of the term varies across the many sub-disciplines: in thermodynamics, for instance, chaos refers to the amount of disorder present in a system – any thermodynamic system always tends towards a maximum state of chaos over time. More recently, after the formulation of chaos theory, the term has been used to describe the unpredictable behavior of a complex system with many variables. In culture, the scientific definition of chaos has seemingly acquired mythic dimensions – it is loosely and often reductively associated with meaninglessness, randomness, and noise. All of these associations make sense, but only in a vague manner that does away with all scientific nuance.¹² In the case of Borges, he was interested in chaos as a literary symbol, the antithesis to order, an endless source of uncertainty and despair – nothing could be more apt in describing the human condition. Despite being literarily, rather than scientifically, predisposed, he did not fall into the trap of painting chaos in broad strokes – to him, chaos was a philosophical and, dare I say, scientific concept worth rendering in intricate narrative detail. His portrayal of the different types of chaos is so nuanced that some critics have suggested that he has, in some way, anticipated science – for instance, Thomas Weissert finds that in the short story “The Garden of Forking Paths,” “Jorge Luis Borges discovered the essence

¹² See Hayles, “Introduction” 1-4 for a more in-depth explanation of the cultural and scientific views towards the word “chaos.” She notes that “To many, the word has now become so thoroughly deprofessionalized that its use is regarded as a signal that one is in the presence of a dilettante rather than an expert” (2).

of bifurcation theory *thirty years* before chaos scientists mathematically formalized it” (223, my italics).

Instances of chaos are found primarily in stories from Borges’s 1944 short story collection, also titled *The Garden of Forking Paths*. It is important here, however, to identify precisely the kind of chaos that Borges is trying to present. Chaos in a Borges story induces uncertainty, but it is a markedly different kind of uncertainty from the ontological variety induced by techniques such as metalepsis and self-reflexivity. Instead, chaos for Borges is a well-defined idea that functions along strict parameters, many of which can be related to an actual reality beyond the text. Three stories in this collection each embodies a particular aspect of chaos – “The Library of Babel” depicts a system’s unavoidable tendency towards maximum disorder, or entropy, through the disproportional number of nonsensical books in the Library compared to sensible ones; “The Garden of Forking Paths,” as argued by Weissert, depicts random, branching events from past to present in a manner similar to bifurcation theory; “The Lottery in Babylon” reveals, as I will argue, the mechanics of chaos theory’s most important tenet: *sensitive dependence on initial conditions*.¹³ The depiction of chaos in these stories are precise, sometimes even mathematically provable, and *always* occur within an unconventional, but realistic, framework.

What would “realism” mean in the case of Borges? My use of the term does not imply that the stories necessarily take place within a historically accurate Buenos Aires or correspond to some locale in the real world that Borges was familiar with. Instead, the worlds that Borges constructs in these stories, even though they seem at first glance unmistakably fantastic, adhere to a set of well-defined logical rules, never once running afoul of them – even if such a story

¹³ For a discussion of entropy in “The Library of Babel,” see Franklin and Levitt 55, and Merrell 74. For how “The Garden of Forking Paths” depicts an effect similar to bifurcation theory, see Weissert’s essay “Representation and Bifurcation: Borges’s Garden of Chaos Dynamics.”

takes place within a fantastical setting, such as an infinite library larger than our known universe, or a fictional Babylon created and dictated by the all-encompassing rules of chance. The elements of internal consistency and mechanical lucidity make them more than stories; they are also thought experiments that demonstrate how chaos works, and what it might mean to be a participant or observer in a series of causally related events unfolding across a universe of infinitely many variables. In such a fashion, his creative process functions similarly to how a scientist, when confronted by the enigmas of his research, dreams up imaginary laboratories in his mind where equally imaginary solutions are tested, prior to committing them to mathematical proofs.¹⁴

In this chapter, I focus on a close reading of two stories, “The Library of Babel” and “The Lottery in Babylon.” While I recognize the merits of Weissert’s reading of “The Garden of Forking Paths” from the perspective of a systems dynamicist, I find that the story has more in common with Everett’s Many-Worlds Interpretation of quantum mechanics than it does with chaos dynamics, and will hence leave it until Chapter 4. There are two points of focus across this chapter worth bearing in mind when reading a Borges story with scientific elements. The more obvious one is of course the mechanics of the physical system in question – in this case, how entropy or sensitive dependence on initial conditions is captured in narrative. The other is about how the narrators of the story experience these phenomena, and how their perception of strangeness elicits a similar response on the part of the reader. This effect is more evident in “The Library of Babel,” but its presence in “The Lottery in Babylon” is also significant and cannot be discounted.

“The universe (which others call the Library)”: Borges’s Library as Macrocosm

¹⁴ See Merrell 87-88.

And yet those who picture the world as unlimited forget that the number of possible books is *not*. I will be bold enough to suggest this solution to the ancient problem: *The Library is unlimited but periodic*. If an eternal traveler should journey in any direction, he would find after untold centuries that the same volumes are repeated in the same disorder – which, repeated, becomes order: the Order. My solitude is cheered by that elegant hope.

Fictions 118 (italics original)

Perhaps the most important achievement of Borges's "The Library of Babel" – arguably Borges's single greatest work – is how alien its setting seems at first glance, only for the reader to realize the extent of its similarity to our own universe upon subsequent readings. Structurally, the similarity is quickly evident, as I will demonstrate. Philosophically, it also happens to set the tone for the rest of Borges's stories: a Librarian, boundlessly optimistic in his youth, "journeyed in quest of a book, perhaps the catalog of catalogs" (112). His eventual failure calls to mind Gödel's statement that a system cannot find in itself a complete description of its own mechanics. The Librarian's tale alludes to humanity's reflex to totalize, only to discover that the cosmos, in all its grand complexity, resists any such attempt at totality.

"The Library of Babel" describes Borges's vision of a total library that encompasses all of existence, an idea which first appeared, as I have mentioned, in his essay "The Total Library." The story is told from the perspective of a dying Librarian – the text itself is said to be "scrawl[ed] on the cover of a book" by his own hands. The Librarian tells, in a tone that oscillates between objective description, abject despair, and desperate hope, of the nature and properties of the Library as well as its history. He includes in this recollection an account of his

own journey, which began as a search for the mythical book that justifies the Library, and which has proved completely futile.

Despite the failure of the Librarian, it is clear that he has at least learned some truths about the Library; it is through his description and analysis of these strange truths that we see a dovetailing of the real and the unnatural. The narrator's establishment of the Library's milieu is precise, and verges upon the technical:

The universe (which others call the Library) is composed of an indefinite, perhaps infinite number of hexagonal galleries. In the center of each gallery is a ventilation shaft, bounded by a low railing. From any hexagon one can see the floors above and below – one after another, endlessly. The arrangement of the galleries is always the same: Twenty bookshelves, five to each side, line four of the hexagon's six sides; the height of the bookshelves, floor to ceiling, is hardly greater than the height of a normal librarian.

(*Fictions* 112)

The detailing of the Library's properties carries on for three more paragraphs. The Librarian's obsession with details serves a larger narrative purpose, as soon becomes clear: the features of the Library operate as the *rules* that the logic of the subsequent story adheres to. In fact, by the end of the fourth paragraph, we are confronted with the key word that much of the story depends on: "axioms" (113).

The exact furnishings of each room, the typographical layout of each book, the topographical composition of the Library itself – all serve as the basis of knowledge upon which several universal assumptions, or axioms, are made. An axiom is a truth statement upon which derivations of further truth statements are built upon. Examples of axioms as used in mathematics are many – for instance, in geometry, an axiom would be something akin to: *a*

straight line is the shortest distance between two points. The operating principle behind an axiom is that it needs not be proven empirically; rather, it is taken to be a self-evident statement of fact. The narrator himself lists two axioms: the first stating that the Library has always been, and will always be, eternal; the second dictating that all books consist of some combination of the same twenty-five symbols. We thus see a series of careful logical steps that leads to the following deduction that the Library is *necessarily* chaotic:

Second (axiom): *There are twenty-five orthographic symbols.* That discovery enabled mankind, three hundred years ago, to formulate a general theory of the Library and thus satisfactorily solve the riddle that no conjecture had been able to divine – the formless and chaotic nature of virtually all books. (*Fictions* 113)

The Library is chaotic based on two postulates: that it contains an infinite number of books, and that each book contains a large enough number of letters that an unthinkable number of combinations can be made.¹⁵ Despite the unnatural setting of the story – that the “universe is composed of an...infinite number of hexagonal galleries” (112) and that it is a “sphere whose exact center is any hexagon and whose circumference is unattainable” (113) – we see that it nonetheless submits to very realistic natural laws, and to an intuitive flow of logic that a reader who is not a Librarian can easily grasp.¹⁶

From this, we get a clear vision of what chaos actually is, and how it relates to the broader concept of entropy. Chaos in “The Library of Babel” is by no means a reductive concept, simplified for a lay reader – it is, on the contrary, incredibly nuanced. A basic summary of the

¹⁵ For a mathematical speculation on the number of possible combinations of books in the Library, see Bloch’s chapter “Combinatorics: Contemplating Variations of the 23 Letters.” The mathematics behind the Library imply that it is far larger than our known universe, which puts all human ideas of scale to shame and renders it an unnatural concept.

¹⁶ In this particular instance, my view on how “The Library of Babel” is unnatural coincides more with Alber’s definition that “the term *unnatural* denotes physically, logically, and humanly impossible scenarios and events” (25).

layout of the Library is found in the following statement: “For every rational line or forthright statement there are leagues of senseless cacophony, verbal nonsense, and incoherency” (Borges 114). This calls to mind Borges’s commentary on the “infinite monkey theorem,” which he briefly mentions in “The Total Library” (*Non-Fictions* 216). This now iconic thought experiment illustrates problems regarding probability, infinity, and time. In its most basic form, the thought experiment depicts a group of hypothetical monkeys typing at set of hypothetical typewriters; the exact numbers of either do not matter. Surely, over time, the monkeys will inevitably produce all the works of Shakespeare. But – and this is an important *but* – the amount of actual readable content produced by monkeys will be infinitesimal compared to the amount of inchoate babble.

The infinite monkey theorem seems to be a perfect explanation of the present state of the library. This seems natural enough, since Borges specifically invokes this theorem in an essay that is clearly a spiritual predecessor to “The Library of Babel.” *The Library contains all possible permutations of sense* – so an axiom might go, formulated in my own terms – *but also, a vastly disproportionate amount of cacophony*. But things get a little bit more complicated as we progress through the Librarian’s account. Towards the end of the narrative, he states that “For while the Library contains all verbal structures, all the variations allowed by the twenty-five orthographic symbols, it includes not a single absolute piece of nonsense” (117). Borges ostensibly suggests that even if a book does not make linguistic sense, it might make at least some form of metaphorical sense for a distant Librarian who chances upon its content. But the deeper implication about probabilities and randomness is present here: it is equally improbable that a book consists of absolute nonsense, as it is to contain absolute sense. Chaos in the Library does not refer to total indecipherability, but rather demarcates a zone somewhere between sense and nonsense. It is the absolute preponderance of this region that drives Librarians mad, for it

suggests not only disorder, but disorder with *a fleeting hope of order* – all Librarians, entranced by this infinitesimal hope, exhaust their lives in search of it.

As hostile and alien as the Library might appear initially to the reader, it is nonetheless recognizable as a model of the actual cosmos. This can be extrapolated from the final lines of the story, which I have included as the epigraph to this section. The telling lines hint at the topology of the Library on a grander cosmological scale: over arbitrarily large distances, seemingly chaotic patterns tend to repeat themselves. When observed from a god's eye view, the Library would appear to the observer like a sheet of static – random, chaotic, but entirely homogenous. This topology results in two observations that are related to one another. The first is, as mentioned, that the state of the Library is entropic, in which a *uniform disorder* has set in – or has been present since the dawn of the Library's existence.¹⁷ The second is that this structure corresponds closely with the large scale structure of *our* universe, and functions entirely in accordance to what has become known as the cosmological principle, which states that on the grand scale, the universe looks the same to any observer, at any point in space, from any possible perspective.¹⁸

Shaw notes that “in order to figure forth that vision (of the human condition) Borges needed to invent disquieting metaphors,” and thus proceeds to suggest that the Library of Babel is one such metaphor: “that of the labyrinth, with its seeming *regularity* combined with baffling *unpredictability*” (91, italics mine). I would go so far as to state that Borges has stumbled upon a metaphor about something far more specific than the “human condition” – he has figured forth, instead, the condition of the universe in general. His portrayal of an entropic state of the universe

¹⁷ Franklin and Levitt have the following to say of the Library's current state: “Thus the Library contains all knowledge and, paradoxically, no information, since the only possible index for the Library would be identical to the Library itself. This situation is the ultimate state predicted by the second law of thermodynamics – a state of maximum entropy and minimum information” (55).

¹⁸ The technical term for this is *isotropy*, which denotes uniformity from all possible orientations.

contains a level of nuance that matches that of a scientific thought experiment, as seen in the lines “he would find...that the same volumes are repeated in the same disorder – which, repeated, becomes order: the Order” (*Fictions* 118). From the perspective of a human, chaos is indeed chaos: not once in a thousand lifetimes would a Librarian come across two similar books, no matter how far he has journeyed from his initial destination, nor how systematic his method of search. But when that perspective is expanded, this local chaos suddenly takes on a recognizable topology, a pattern on the grand scheme of things, as shown by the uniformity of Library across vast distances – an observation corroborated by the cosmological principle.

Thus, we also make note of the fact that Borges’s thought experiments are not simply mental exercises of the academic variety – like all good fiction, they distinguish themselves by incorporating a *human* element through the use of narrators or characters. A mere resemblance to something as grand as the cosmological principle would mean nothing if there was no relatable observer to convey its intricate vastness, or the loneliness of its labyrinthine hallways that drive Librarians, who cannot perceive its larger order, to despair. I am reminded of Marie-Laure Ryan’s essay critiquing the narrative elements behind Schrödinger’s original parable, while exploring the narrative possibilities of its subsequent fictional adaptations. In her survey of how fiction eventually came to adapt and retell the fable of Schrödinger’s cat, Ryan suggests that the “theoretical material” of thought experiments might be adapted into a more complicated and involving story through the use of several narrative features. She lists them in the following order:

- A world populated with individuated objects, some of which are characters;
- Events that cause changes in the state of the world;

- Affective reactions by the characters to the new state of the world, some of which may lead to actions that induce more changes or restore the initial situation. (Ryan 177)

Ryan's list is pertinent, not only to an analysis of "The Library of Babel," but to how Borges meaningfully expands the concept of the thought experiment as a whole. While a pure thought experiment might succeed in piquing the scholarly interest of an academic audience, it has to take on additional narratorial properties if it is to generate any lasting emotive impact upon the average reader. Having already crafted a seemingly unnatural but nonetheless physically relatable world, Borges uses the human element of narrative to achieve the latter effect – "characters" and their "affective reactions," thus, have as much pertinence to a Borges story as "events." For instance, Borges does not only describe chaos, but also associates it with several kinds of emotive responses, such as curiosity, wonder, disorientation, and despair.

A part of how curiosity and wonder are evoked in the reader lies in what Shaw calls the "narratorial stance" (129). He suggests that the manner with which Borges situates the narrator's perspective in relation to the world he exists in, and is attempting to describe, is important to an interpretation of the story as a whole. In "The Library of Babel," the meticulous detail present in the opening paragraphs seem unremarkable at first glance – it is business as usual in the art of world-building. But upon subsequent reading, it becomes clear that Librarian speaks less like how we would imagine a Librarian to speak of the Library, and more like how the average person might describe an alien world *in terms of a human vocabulary*. For if the narrator were simply addressing another Librarian – as we initially assume he is – there would be no need for statements such as "Like all the men of the Library, in my younger days I traveled; I have journeyed in quest of a book, perhaps the catalog of catalogs" (*Fictions* 112); that would be

common knowledge to fellow Librarians. In fact, all of the world-building seems specifically addressed to a reader *not* from the Library: a reader who will undoubtedly be impressed by the Librarian's words and draw comparisons between the Library and his own world. An inhabitant of the Library would conceivably dismiss the Librarian's account as so much reiteration of what is already commonsensical. But a real reader (by which I mean, a reader from our world) would make note, consciously or unconsciously, of the common vocabulary shared between the Librarian and himself – especially the seemingly innocuous turns of phrases, such as referring to the Library as “universe,” reiterating the enduring presence of irrefutable “axioms,” or even the line that “[l]ight is provided by certain spherical fruits that bear the name ‘*bulbs*’” (*Fictions* 112, my italics). A more overt example can be found on page 114, where it is noted that a traveler found a book whose “lines were written in Portuguese.”

The references to our world are perhaps no more than fleeting echoes. But these echoes can and do resound in the mind of the reader, as part of our habit of comprehension lies in making notes of similarities and differences in order to understand an unfamiliar concept. The more we find that the Library bears certain similarities to our own reality, the more we feel tempted to search for further similarities – so that eventually our attention is drawn to the images of chaos, entropy, and large-scale cosmic structures. Wouldn't it be interesting if such strange phenomena actually occur in our universe as well! – we ask. And then it dawns upon us that perhaps they do. These concepts, so difficult to grasp when presented in academic papers and mathematical formulas, become vivid mental images that arise in the reader's imagination upon textual prompts.

This is to say nothing about the “affective reactions by the characters to the new state of the world” (Ryan 177). The story chronicles numerous instances of emotive responses by the

inhabitants of the Library towards a new perception of its layout and its infinite possibilities. In fact, much of the story depends upon the narrator's account of how each new "theory" of the Library is conceived, and subsequently *received*, by the Librarians. For instance, it is noted by the narrator that "When it was announced that the Library contained all books, the first reaction was unbounded joy" (*Fictions* 115) – but shortly after, "That unbridled hopefulness was succeeded, naturally enough, by a similarly disproportionate depression. The certainty that some bookshelf in some hexagon contained precious books, yet that those precious books were forever out of reach, was almost unbearable" (116). Fanatics destroy senseless books in a fit of collective rage; "infidels," abandoning any hope of discovering the tiniest semblance of order, declare "that the rule in the Library is not 'sense,' but 'non-sense'" (117). Clearly, the primary struggle depicted in "The Library of Babel" is not a world at odds with its own paradoxical elements of order and disorder, but rather the uphill battle faced by a group of human Librarians in making teleological sense of this paradox.

Borges extends the boundaries of the thought experiment by incorporating affect, allowing the story to convey not only the physical mechanisms of reality, but also what it feels like to be a minuscule observer in an unknowable universe. Through the use of a narrator who asks the same questions of his world as we ask of ours, he piques our curiosity and taps into our sense of awe; through a depiction of how the race of Librarians apprehend their own cosmos, we are brought face to face with our own sense of disorientation regarding reality. This, perhaps, was what Shaw has in mind when he speaks of Borges's "vision of the human condition which has implications no less easily identifiable because they may not be directly spelled out" (91). In narrative terms, "The Library of Babel" shows us that while a thought experiment is

fundamentally about a mechanical principle, a *story* can be about both a mechanical principle and its effect on humanity at the same time, as Ryan eloquently concludes:

Narrative, however, is first and foremost an expression of human experience, and as humans we experience life on the level of cats, not on the level of electrons. Without denying value to writing experiments that attempt to develop formal equivalents to the behavior of subatomic particles, I believe that there is no reason to give up proven modes of representation that account for our macro-level interactions with the world, with ideas, and above all with other humans. (Ryan 184)

And Borges himself, quite subtly, has his narrator embed this statement in the final page of the story: “Methodical composition distracts me from the present condition of humanity” (*Fictions* 118). The Librarian, whose methodical account of the Library has more than adequately described the condition of humanity, seems to sell himself slightly short.

The Lottery and Necessary Chaos

This *apologia* is now numbered among the sacred Scriptures. It pointed out, doctrinally, that the Lottery is an interpolation of chance into the order of the universe, and observed that to accept errors is to strengthen chance, not contravene it.

Fictions 104

Gleick notes that chaos theory was born from the tiny errors found at the margins of practical experiments. He speaks about how Philip Marcus, an astronomer and mathematician, saw “what he realized years later had been the signs of chaos. He would stop (during an experiment) and say, ‘Gee, what about this little fluff here.’ And he would be told, ‘Oh, it’s

experimental error, don't worry about it'" (Gleick 56). While these errors initially appeared negligible, experimental scientists were faced with a reality check when these tiny inconsistencies eventually began to compound. Chaos theory gained traction when the scientific community increasingly came towards the recognition that these complex chaotic systems – also called *nonlinear* systems – were the norm rather than the exception. They were soon found to be everywhere, hiding within the delicate biosphere of a pond, the fluctuations of populations, and the economy.¹⁹ These systems, even though they were deterministic, became wildly unpredictable over time, with even a slight variance in initial conditions causing a vastly disproportionate shift in the final result. Tracing the historical and intellectual roots of chaos theory, Gleick manages to identify an old, orally-transmitted parable about how the lack of a shoe nail led to the fall of a kingdom, which illustrates the idea that small causes can lead to large effects.²⁰ This principle – called the *sensitive dependence on initial conditions* – became the foundation of science of chaos.

I refer back again to Weissert's observation that Borges's ideas predate certain scientific and mathematical formulations. "The Lottery in Babylon" might be construed as one such instance. The idea of an omnipresent, chaotic Lottery governing all aspects of its participants' lives can be interpreted as a thought experiment depicting the sensitive dependence on initial conditions, written almost twenty years before meteorologist Edward Lorenz published his landmark paper in 1963 on deterministic chaos, titled "Deterministic Nonperiodic Flow." The story tells of the titular Lottery's humble beginnings as "a game (of chance) played by commoners" whose "procedure...was rudimentary" (*Fictions* 102). But over time, the stakes of the Lottery grow more severe, its inner workings more arcane, its consequences more pervasive.

¹⁹ See Gleick 59-61.

²⁰ Gleick refers to the parable "For want of a nail" (23) when tracing the possible origin of what we now know as the Butterfly Effect.

Eventually, it becomes “a major element of reality” (101), with the number of drawings so great that it is essentially infinite, wherein “no decision is final; all branch into others” (105). The Lottery affects all things in Babylon, from the fates of men to the impersonal fates of objects: any *input* into the Lottery translates into a wildly disproportionate *output*.

Unlike “The Library of Babel,” “The Lottery in Babylon” is not an overtly mathematical text – it is not so much a model of a chaotic system as it is a statement that chaotic systems exist everywhere, and that reality and life exhibit a richness of behavior that cannot be boiled down to simple mathematics.²¹ We can, in fact, draw a parallel between the history of chaos theory and how the Babylonians sought to understand the mechanisms of their own Lottery. Gleick notes that

Mathematically inclined biologists of the twentieth century built a discipline, ecology, that stripped away the noise and color of real life and treated populations as dynamical systems. Ecologists used the elementary tools of mathematical physics to describe life’s ebbs and flows. Single species multiplying in a place where food is limited, several species competing for existence, epidemics spreading through host populations – all could be *isolated*, if not in laboratories then certainly in the minds of biological theorists. (Gleick 59, italics mine)

Although ecologists managed to “isolate” certain trends in population growth and created models out of them, these models often demonstrated erratic behavior, simply because unaccounted variables affected the behavior of these models. There was no means of simplifying nature without encountering chaos, even though the entire purpose of “oversimplifying was to model

²¹ I imagine that should a story strive to depict a chaotic system mechanically, it would consist of a minimal number of variables, and show that chaos occurs even in a relatively simple system. For instance, a simple experiment consisting of a pendulum attached to another pendulum – called the “double pendulum experiment” – reveals that even a simple setup can exhibit complex, unpredictable behavior. Such a story would be the opposite of “The Lottery in Babylon,” which depicts a large number of variables.

regularity” (Gleick 65). Ecologists, it appeared, wanted nature to replicate what they wished to see. Borges, in a prophetic passage, managed to summarize – and in many ways anticipate – the root cause of this turbulence and uncertainty in the field of science:

However unlikely it may seem, no one, until that time, had attempted to produce a general theory of gaming... Nonetheless, the semiofficial statement that I mentioned inspired numerous debates of a legal and mathematical nature. From one of them, there emerged the following conjecture: If the Lottery is an intensification of chance, a periodic infusion of chaos into the cosmos, then is it not appropriate that chance intervene in *every* aspect of the drawing, not just one? Is it not ludicrous that chance should dictate a person’s death while the circumstances of that death... should *not* be subject to chance? (*Fictions* 104, italics original)

Here, the Babylonians are doing the opposite of what ecologists in real life had been doing – they are trying to ensure that the Lottery is chaotic at every step, at every moment, of the drawing itself. It seems, though, that such an attempt on the part of the Babylonians is ironic, because there is no need to enforce chaos – chaos *inheres* in reality. This irony is reinforced in the story’s final sentences about the origins and nature of the Company, which created and administers the Lottery: some scholars of Babylon conjecture that “*the Company has never existed, and never will*. Another... argues that it makes no difference whether one affirms or denies the reality of the shadowy corporation, because Babylon is nothing but an infinite game of chance” (*Fictions* 106, italics original). Borges’s statement here, written in 1941, is something that scientists only came around to in the latter part of the century: reality, although deterministic, is chaotic – to pretend otherwise is naiveté. Any attempt by the Babylonians to infuse chaos into reality is an exercise in tautology; by the same token, any attempt by ecologists and physicists to infuse order

into reality is an exercise in futility. Eventually, chaos theory extended scientific discourse by proposing that chaos be integrated into the scientific enterprise, rather than be forcibly excluded from it. However, the road to such integration was necessarily paved with disorientation and despair, for over the course of centuries “physicists had *learned* not to see chaos” (Gleick 67, italics original). After such a prolonged period of regarding chaos as an aberration, accepting chaos meant rethinking some of the paradigms of science.

The worldview held by the Babylonians, therefore, runs counter to the spirit of certainty reinforced by centuries of adherence to Newtonian dogma. By admission of the narrator himself, the Babylonians viewed chaos as a source of both despair and hope: “I have known that thing the Greeks knew not – uncertainty. In a chamber of brass, as I faced the strangler’s silent scarf, hope did not abandon me; in the river of delights, panic has not failed me” (*Fictions* 101). And, like all true gamblers, the Babylonians were attracted to chance and “enjoyed all the vicissitudes of terror and hope” (103). In fact, the narrator goes so far as to admit that he is inextricably *enmeshed* within the entire machinery of chaos – pointing out his own unreliability as a communicator of the Lottery’s tenets, he says: “I myself, in this hurried statement, have misrepresented some splendor, some atrocity... Our historians, the most perspicacious on the planet, have invented a method for correcting chance; it is well known that the outcomes of this method are (in general) trustworthy – although, of course, they are never divulged without a measure of deception” (105, parentheses original).

The irony in “The Lottery in Babylon” is palpable, especially in retrospect. In reality, scientists across the various disciplines grappled with the definitions of chaos, and how it seemed to emerge from *all* of the sciences at the same time, wildly different yet possessing eerie strands of similarity: “Each discipline considered its particular brand of chaos to be special unto itself.

The thought inspired despair. Yet what if apparent randomness could come from simple models? And what if the *same* simple models applied to complexity in different fields?” (Gleick 80)

Much of what transpired over the formative years of chaos theory involved fighting not sets of data, but existing preconceptions of what a scientific discipline should be. The thought that any single principle could inhere in all disciplines – especially one that implied the existence of chaos – ironically made interdisciplinary communication difficult; scientists from different branches of science had been too used to thinking in silos. And for the most part, “No one wanted to waste time on a line of work that was going awry, producing no stability” (65).

In retrospect, the resistance of the scientific community towards disorder – and moreover, of a holistic view of disorder within science – seems in the present day woefully immature. The intuition of Borges, as shown from the perspective of both the narrator and the Babylonians as a whole, is that the Lottery exists to a similar degree in all things – from nature to the fates of men, from the economy to the hierarchies of society. Similarly, in terms of chaos theory, it was eventually discovered by the mathematical physicist Mitchell Feigenbaum that chaos was universal to all dynamical systems – although the scientific community initially provided a lukewarm response to such a radical view.²² Had they the Babylonians’ zeal towards embracing chaos, the order within chaos would have been established sooner – in fulfillment, perhaps, of the Librarian’s (or humanity’s) hope of “order: *the* Order.”

Part of Feigenbaum’s methodology – or ideology – when searching for a solution to chaos was “to *create intuition*” (Gleick 178, italics original). That can be reasonably said of Borges’s creative method as well – although as an artist, Borges had the natural faculties for such a process, whereas Feigenbaum had to actively seek inspiration from how artists interpreted the

²² See Gleick’s chapter “Universality.” Furthermore, Feigenbaum discovered that all chaos was attributable to a numerical constant, 4.6692016090. This number is now known as the first Feigenbaum constant.

world. Feigenbaum suggested that artists such as Vincent van Gogh, Salomon von Ruysdael, and J.M.W. Turner recognized the need to depict the complexity of nature in a manner that exemplified the *essence* of complexity, without also abandoning the attendant details that result in such complexity.²³ For Borges, the equivalent of this method can be found in how he situates seemingly unnatural phenomena and settings within a framework of consistent, appreciable logic. This, it seems, is the only way to describe a world wherein

Some part of the imagery is missing. If you ask what the equations really mean and what is the description of the world according to this theory, it's not a description that entails your intuition of the world. You can't think of a particle moving as though it has a trajectory. You're not allowed to visualize it that way. If you start asking more and more subtle questions – what does this theory tell you the world looks like? – in the end it's so far out of your normal way of picturing things that you run into all sorts of conflicts. Now maybe that's the way the world really is. But you don't really know that there isn't another way of assembling all this information that doesn't demand so radical a departure from the way in which you intuit things. (Gleick 185, transcription of interview with Feigenbaum)

As explained by Feigenbaum, the difficulties of communicating such a radically different conception of a world – a world that we now know contains relativity, quantum mechanics, and chaos theory – are numerous and self-explanatory. But as we have just seen in the history of chaos, we do tend to find a way to go around such problems. Just as the walls between the various silos of science began to break down in search of a way to rationalize and to explain these mechanisms of reality, the walls between science and the arts might have already begun its

²³ Gleick 184-87.

silent crumble sometime in the 1940s. In order to even speak of counter-intuitive phenomena, one had, as Feigenbaum notes, to have the faculties of both the scientist and the artist.

There is a concept which corrupts and upsets all others. I refer not to evil, whose limited realm is that of ethics; I refer to the infinite.

Borges, “Avatars of the Tortoise”

Chapter 3: Fictions of the Infinite

Let me here attempt to posit a thought experiment of my own. A research student is faced with the deadline of his Masters thesis, and he is woefully behind schedule. Like Hladik from “The Secret Miracle,” he attempts to take the position of the Tortoise from Zeno’s parable – he understands that, so long as time remains infinitely divisible, the deadline shall never reach him. For every five days that the deadline advances, he adds 5,000 words to his thesis; for every day more, he adds 1,000 words; for every hour, he adds slightly over 40 words, and *ad infinitum*...he realizes that he can write forever without the deadline ever catching up. But alas, for the graduate student, reality does not operate in this fashion – before his thought experiment can reach its infinite conclusion, the deadline catches up and crushes him.

As fascinated as Borges was by the myth of Zeno, he was torn between its apparent logical “incontestability” (*Non-Fictions* 47) and its continual resistance to being enacted in real life. For Borges, the concept of infinity – and by extension *eternity* – remained the most enigmatic and elegant puzzle that undergirds reality. For infinity comes with a large number of logical difficulties. When suggesting that “the most astounding fiction used in mathematics is infinity,” Merrell points to the following example endemic to calculus:

To calculate the length of an arc it is assumed to be a sequence of rectilinear contours with an increasing number of sides. As the number of straight lines in this sequence approaches a limit, the length of the arc is defined as the limit of the sequence. And what

does this limit, which adapts the straight to the curved, ultimately become? An inconceivable, infinite number of steps. The curved world of our senses is the quasi-final step in an infinite sequence of infinitesimally flat worlds that can exist only as an act of mind. (Merrell 17)

The logical difficulty here – the assumption that a curve consists of an infinite sequence of “rectilinear contours” – is not only apparent in the manner with which we calculate the length of a curve, but also in the disjunction between “the curved world of our senses” and the way in which we are forced to conceive of such a world as an infinite series of points. The problem of infinity as it appears to a human being, Merrell hints towards here, lies between *perception* and *conception*. Our senses perceive the world as curved. However, the sense-making faculties in our mind has to perceive these curves as an infinite number of straight lines, or points – an “act of mind” which is part and parcel of real world engineering calculations necessary to modern technology and infrastructure.

Is infinity, then, nothing but a pure invention of the mind, which cannot help but think of everything as a sequence of steps? This seems to be one of the central problems that Borges wrestles with across his fiction. Infinity in the works of Borges is inextricably bound to *experience* – the experience of eternity in “The Immortal,” for instance, or the experience of column after interminable column of bookshelves in “The Library of Babel” that, on the macrocosmic scale, form a recursive pattern. Even the horror faced by the narrator in “The Book of Sand” after he discovers the titular infinite book constitutes an experience. The reason he portrays infinity from a largely experiential point of view is simple: his stories are designed to evoke a kind of double-take on the part of the reader regarding reality, and especially regarding infinity, which we have begun to take for granted.

I am partial towards Sylvia Molloy's use of the term "double-mistrust" when describing Borges's technique, although I take slight issue with her subsequent statement that "the absence of realistic mimesis" (Molloy 7) characterizes the writer's work. For at least some part of Borges is undeniably realistic – without it, we would not have the easily identifiable allusions to recursive patterns in reality, or references to such ideas as sensitive dependence on initial conditions. But his use of realistic elements, especially those that relate to mathematical conceptions of infinity, makes us question if these elements are indeed realistic, or instead imagined. A character might find himself utterly convinced of Zeno's logic, thereby delaying his inevitable execution by firing squad indefinitely – in his mind. Unfortunately he discovers, by story's end, that Zeno's interpretation of time is ultimately a fallacy, as he is felled by the firing squad. Through such narrative turns, readers are guided through a process of *how* the mind conceives of infinity, whether it exists in time or in space; occasionally, this illusion is upheld, while at other points it is brought into sharp conflict with how reality operates in practice. A tension exists between theory (the thought experiment) and the *all-too-realness* of our world.

Reading through a Borges story, we might be made to think instinctively, at the story's beginning, that he means for reality to be portrayed a certain way. Shaw notes a recurring pattern across Borges's various opening strategies – that by and large, they establish a sense of certainty within the reader, only to undermine it by the end.²⁴ The overarching narrative mechanism of the Borges's stories is to draw a line between what we think is reality, and what reality actually *is* – and we are at a loss to make out what that line means. That, I think, summarizes Borges's narrative spirit.

Affirming Entropy: On Infinity and Repetition

²⁴ See Shaw's chapter, "Opening Strategies."

The important point is that between Borges's fiction and the mathematician's line representing an imaginary and infinitesimally thin division between one entity and another, there is a fundamental difference. The mathematical fiction has nothing to do with the experienced world; Borges's story, in contrast, is populated with things of everyday living.

Merrell 57

Borges's complex philosophy regarding infinity cannot be ascribed to merely one or two sources. A large range of essays constitute his approach to the subject: "The Perpetual Race of Achilles and the Tortoise," "A Doctrine of Cycles," "A History of Eternity," "The Total Library," amongst others too numerous to name; a few of these essays exhibit an oscillation between contradictory viewpoints.²⁵

A survey of all of Borges's works, whether fiction or non-fiction, brings us to a confrontation with a number of diametrical oppositions within the concept of infinity – infinity by multiplication versus infinity by division; infinity in time versus infinity in space; infinity in mathematics versus infinity in reality. He understood that beneath the symbol " ∞ " lay an almost unimaginable amount of complexity. One of the most cited examples of how Borges interprets spatial infinity lies in the structure of the Library in "The Library of Babel": "*The Library is a sphere whose exact center is any hexagon and whose circumference is unattainable*" (Fictions 113, italics original). Such a structure whose very boundary describes infinitude, as I have mentioned in the previous chapter, allows for so much variation in the contents of each individual hexagon that it results in chaos. Borges's idea of the universe's infinitude reaches a

²⁵ A crucial point upon which Borges wavers is the nature of time, whether it is linear or infinitely divisible: "It can often seem as though Borges is unable to decide what form of time he believes in, whether he takes seriously the possibility of the stopping of time or is forced to acknowledge the inevitability of linear time" (Butler 193). However, Butler argues that in general, "Borges is arguing that both alternatives are simultaneously true" (193).

simple, but elegant solution – that over immeasurably large distances, and assuming the same general conditions for each individual hexagon, the Library will appear *isometric*; that is, it will look largely the same when viewed from any imaginable angle by a hypothetical observer. This idea of repetitiveness, or self-similarity, across infinite space is a curious element of nature noted by mathematicians, astrophysicists, and geophysicists alike – for instance, the mathematician Benoit Mandelbrot posited an argument that coastlines are not only infinitely long, but display self-similar patterns (called fractals) past “ever-smaller subbays and subpeninsulas – at least down to atomic scales” (Gleick 95-96).

We have established that infinity on the grand scale begets repetition – at least, that was how Borges imagined it. But the issue he was clearly more interested in was whether temporal infinity exhibits the same kind of properties as its spatial counterpart. In fact, Borges was obsessed with the nature of time, and of its relationship – or non-relationship – with eternity. One of the more notable stories in his oeuvre that explores this relationship is “The Immortal”: in this story, a Roman military tribune named Marcus Flaminius Rufus hears, from a mysterious dying rider, about the existence of a “river whose waters give immortality” (*Fictions* 184). This river, Rufus is told, lies next to the fabled City of Immortals. After a long, perilous journey during which he finds and enters the City – a work of sinister architecture described as “a chaos of heterogeneous words, the body of a tiger or a bull pullulating with teeth, organs, and heads monstrously yoked together yet hating each other” (188) – he discovers that he has become immortal after drinking from a dirty stream flowing just before the City. He also meets one of the Immortals, Homer, who wrote the *Odyssey* more than a thousand years earlier (190). Here, the narrative becomes speculative and at times appear deliberately confused. Rufus makes a statement about immortality and infinite time that has acquired some stature amongst Borges

critics: “over an infinitely long span of time, all things happen to all men” (191). The confused nature of the narrative might be found in the instances where Rufus apparently conflates himself with Homer and the other immortals – this slip of narration is most apparent in the following line: “*His* (the Immortal’s) body was a submissive domestic animal; all the charity it required each month was a few hours’ sleep, a little water, and a scrap of meat. But let no one imagine that *we* were mere ascetics” (192, italics mine).

There are several subtleties about time – some of which are presented rather overtly by Borges – that must be unpacked here. The quote “over an infinitely long span of time, all things happen to all men” prefaces a lengthy exposition in Part V of the story, which recounts Rufus’s subsequent exploits in the world under various identities and in different eras. Certainly, the logic of the story here is reasonable. If we were to compare it to “The Library of Babel,” where an unlimited number of repetitions happen across infinite space, shouldn’t it naturally follow that the same should occur in infinite time as well? Shouldn’t events, as long as they proliferate across an endless succession of temporal instances, repeat themselves not only once, twice, but an infinite number of times? At the end of the story – assuming that the reader reads the story in isolation – it seems that this is the natural stance to take. But Borges’s own stance on the entwined issues of eternity and repetition is a lot more complicated than “The Immortal” might seem to suggest at first glance.

On the one hand, we have the writer’s acknowledgement in “The Total Library” that “half a dozen monkeys provided with typewriters would, in a few eternities, produce all the books in the British Museum” (*Non-Fictions* 215).²⁶ In “The Immortal,” Borges seemingly equates the infinite monkey theorem to the life of Rufus. Just as how, given an eternity, there

²⁶ In a footnote, Borges states that “Strictly speaking, one *immortal* monkey would be sufficient” (215, italics mine), which illustrates his commitment to the thought experiment.

should be no reason why a monkey should not produce all the works of literature an *unlimited* number of times, so too, given the lifespan of an immortal, there should be no reason why Rufus should not live the lives of all men. If all the works of Shakespeare could be produced through an endless amount of random typing, should it not be an axiomatic deduction that Rufus will, inevitably, experience the life of Homer, of Shakespeare, of his own – not only once, but a countless number of times?

As it always is with Borges, the answer is not so simple. For, on the other hand, we also have to take into account Borges's essay, "The Doctrine of Cycles", where he actually mounts an *attack* on Nietzsche's doctrine of the "eternal return," the philosophy of which "The Immortal" strongly echoes. To accomplish this he invokes George Cantor's set theory and the second law of thermodynamics, the second of which interests us here.²⁷ Nietzsche's idea of the Eternal Return is premised on an assumption that the universe is finite – more precisely, that the *number of atoms* in the universe is finite – and is thus capable only of a finite number of permutations. Over an infinite amount of time, these finite permutations will no doubt be exhausted, according to Nietzsche, and then be forced towards cyclical recurrence. Borges's counterargument to this is the second law of thermodynamics, which states, in its most fundamental terms, that all natural processes run one way in time – forwards – and not the other. This process is known as entropy – a concept whose permutation has already been discussed in Chapter 2 – and affects everything in the universe. The clearest example is that of the car and its gas engine – once the car expends fuel to move forward, its motion cannot be reverted to the state of fuel.²⁸

²⁷ The second law of thermodynamics is attributed to Nicholas Léonard Sadi Carnot, who effectively created the sub-discipline of thermodynamics in the book *Reflections on the Motive Power of Fire*. The actual formulation of the second law was made by Rudolf Clausius and Lord Kelvin, who built upon his work.

²⁸ Complex processes in nature are always *irreversible* – basically, this derivation of the second law of thermodynamics suggests that while certain simple, isolated processes can be reverted to its starting state, the larger environment in which it occurs cannot. This accounts for the entropic nature of the universe at large: it

Borges understands as much, as he demonstrates in the following statement: “It suffices to project a light onto a black surface to convert it into heat. Heat, however, will never return to the form of light” (*Non-Fictions* 122). Subsequently, he describes entropy to account for the invariable fate of the universe:

The first law of thermodynamics declares that the energy of the universe is constant; the second, that this energy tends towards isolation and disorder, although its total quantity does not decrease. This gradual disintegration of the forces that make up the universe is entropy. Once maximum entropy is reached, once different temperatures have been equalized, once any action on one body or another has been neutralized, the world will be a random assemblage of atoms... At some point, [the universe] will no longer be anything but heat: an equilibrium of immobile, evenly distributed heat. Then it will have died.²⁹ (*Non-Fictions* 122)

By quoting the second law of thermodynamics, Borges flatly refutes Nietzsche that any sort of recurrence in time is not possible simply due to the irreversible nature of processes. No matter how much time elapses, no amount of wishful thinking can “return (heat) to the form of light.” For Nietzsche’s concept of the Eternal Recurrence to be in any way possible, there would have to be an external energy source *beyond* the universe that negates its tendency towards a final entropic state.

That this refutation of Nietzsche was written before “The Immortal” is significant: “The Doctrine of Cycles” was published in 1936, whereas “The Immortal” was published in *The Aleph*

tends towards a state of disorder and can *never* regain its initial order, no matter how much time elapses. For an academic elucidation of the subject, see Umberto Lucia’s article “Probability, ergodicity, irreversibility and dynamical systems” at <https://doi.org/10.1098/rspa.2007.0304>. For a lay explanation of irreversibility along with simple examples, consult https://www.engineersedge.com/thermodynamics/irreversible_process.htm. Borges uses irreversibility as a *direct* counterargument to Nietzsche’s Eternal Return.

²⁹ Borges is referring here to the “heat death of the universe”; this concept refers to the hypothetical end of the universe in which entropy reaches its maximum.

in 1949. Even if Borges's own attitudes towards time may have shifted over the years, it is important to note that chronologically speaking, the writer has thought extensively about time and entropy before writing "The Immortal" – some of this knowledge, I argue, has seeped into the story's construction.³⁰ Rex Butler, in contrast to earlier critics of Borges, picks up on what in retrospect seems painfully obvious but whose deeper philosophical implications have largely been glossed over: the central quest of Rufus is the *search of the other river whose waters take away immortality* (*Fictions* 192). And the crux of the story lies in the fact that Rufus succeeds in finding it – the tale of immortality, therefore, is told from the perspective of an immortal-turned-mortal. The central thesis of Butler's essay is that immortality inevitably *ends*: given an infinite period of time, an infinite number of repetitive cycles of life, any Immortal will certainly discover the second stream which returns him to mortality.³¹

Critics often point to Rufus's confused account of his own identity as an affirmation of the Nietzschean Eternal Return, or at least to a concept along those lines. Shaw writes that "Homer, Rufo, Cartaphilus and Borges are in some sense one and the same; there is no such thing as individual personality," and that this obliteration of individual identity is a necessary consequence of immortality, given that "all things happen to all men" (Shaw 103; *Fictions* 191). But once we consider that "The Immortal" is, ironically, written from the standpoint of a mortal, it becomes clear that despite Rufus's confused ramblings about identifying (or misidentifying) himself as Homer, despite his lengthy descriptions about leading the lives of other men, his perception of time as cyclical is shown to be ultimately an illusion. Rufus himself, subconsciously, acknowledges this very fact. Towards the end of the story, he says:

³⁰ I am tempted to think of Borges himself as one more example of a time irreversible system – what he has thought cannot be unthought.

³¹ See Butler 190-91.

As the end approaches, there are no longer any images from memory – there are only words. It is not strange that time may have confused those that once portrayed *me* with those that were symbols of the fate of *the person that accompanied me for so many centuries*. I have been Homer; soon, like Ulysses, I shall be Nobody; soon, I shall be all men – I shall be dead. (*Fictions* 194, italics original)

Given that we have already read Borges’s diatribe against Nietzsche invoking the entropic fate of the universe, it is difficult not to ascribe a similar meaning to Rufus’s words at this point.

Rufus’s chilling final statement – “soon, like Ulysses, I shall be Nobody; soon, I shall be *all men* – I shall be *dead*” (194, italics mine) – equates the fate of all men with death. We might unpack the philosophy behind this statement even further. Given infinite time, it is inconceivable that an Immortal should not rediscover death, at least once; given that the fate of all men is death, even if he were given the opportunity to live the lives of all men, the experience of death would statistically predominate. If time’s arrow were to be infinite, Borges intimates, it would not be cyclical – rather, like entropy, it entails a slow, irreversible petering out from order to disorder.

“The Immortal,” it seems, is a thought experiment demonstrating the *experience* of the thermodynamic arrow of time: in other words, entropy. What we know of entropy has thus far been relegated to cosmological and mathematical conjectures. But what Borges does here is to introduce a human element to entropy: “The Immortal” is basically a story of how memory becomes corrupted and eventually *homogenized* over an incalculable length of time. The question that Borges asks across this story is twofold: not only *what if*, but also *how does it feel like*? Provided with Nietzsche’s own set of parameters – a finite number of atoms and infinite time – Rufus’s gradual mnemonic decline and his almost paradoxical encounter with both immortality and mortality appear to demonstrate that a cyclic view of time is not only fallacious

in theory, but also impossible to conceive in experience. Peeling back the labyrinthine layers of narrative, we find that Rufus's confused account of the cyclic nature of time does not confirm time's periodicity, but rather refutes it. Even if Borges's position regarding time wavers continuously across his lifetime, the way this particular story interprets eternity seems to be consistent with the second law of thermodynamics. Nietzsche's ideal of the Eternal Recurrence remains, like Zeno's paradox, an intellectual ideal: the confrontation between Nietzsche's game of recurrence and the game of thermodynamics proves fatal to Nietzsche.³²

Real, All Too Real: Borges's Infinity by Division

The line consists of an infinite number of points; the plane, of an infinite number of lines; the volume, of an infinite number of planes; the hypervolume, of an infinite number of volumes...
No – this, *more geometrico*, is decidedly not the best way to begin my tale.

Fictions 480

Paradoxes in Borges, however, do not always result in such a clean-cut resolution – more often, they are examples of a tug-of-war between multiple, and sometimes contrasting, interpretations of infinity. Given the author's preoccupation with the validity or non-validity of Zeno's arguments, it is not surprising to find that these tugs-of-war occur most frequently across stories of the "Zeno variety" (Merrell 31), where Borges presents variations on the theme of infinite divisibility seen in Zeno's paradox. We might find an implicit tug-of-war across two stories: "The Book of Sand," which was written in 1975 and contains the use of symbols

³² A paraphrase of Borges's own statement in "The Doctrine of Cycles": "The clash between Cantor's lovely game and Zarathustra's lovely game is fatal to Zarathustra" (*Non-Fictions* 117) – an illustration that Borges can be brutally pointed, rather than wavering, in his rhetorical stance in some cases.

attributable to Borges's later style, and "The Secret Miracle," written in 1944. Both of these stories address infinity by divisibility: in other words, the mathematical supposition that an uncountable number of points exist between two other points, whether in space or in time.

Both stories depict the clash between reality and intellectual paradox – between perception and conception of reality – from different perspectives. "The Book of Sand" is an example of what critics identify as Borges's late style: in contrast with his earlier works of fiction, the narrative mechanics, strategies and symbolism used is relatively simplified. Shaw links Borges's gradual shift in narrative technique to a shift in thematic focus: the writer, he argues, "is concerned, [no longer] with the mystery of reality, but with the mystery of the individual human personality" (75). In addition to Shaw's observation, I would further posit that Borges's late style appears more simplified because he subsequently found a way to pare his earlier elaborate mechanisms into a kind of symbolic shorthand later on in his career. He realized, for instance, that he no longer had to dive into a deep systematic description of reality given how much he had already written on the subject – it sufficed for him to hint towards his existing corpus of literary symbols and philosophical treatises with no more than a few brief words or a couple of sentences. This means that, in order to appreciate the full significance of his later stories, one has to take into account his earlier ones. But it also gives us the luxury of summarizing the general thrust of a late Borges work in one or two sentences. In the instance of "The Book of Sand," the core concept is relatively simple: we are confronted with the fact that our perception of the world as consisting of discrete and finite objects is deceptive – theoretically speaking, we can "zoom in" infinitely, so to speak, at any point in space.

In the story, the narrator, a bibliophile of sorts, is visited by a Bible seller who offers to sell him an infinite book. The narrator is perplexed by the book, which, despite having a cover

and a back, contains an endless number of pages in between. He offers to buy the book at an exorbitant price, only to discover, at the end, that the stranger “had entered my house already determined to sell the book” (*Fictions* 482). As with many of Borges’s narrators who become burdened by the curse of knowledge, the narrator finds that the book, which embodied a literal infinity, “was a nightmare thing, an obscene thing, and that it defiled and corrupted reality” (483). Eventually, to rid himself of it, the narrator chooses to hide the book in the National Library “on one of [its] damp shelves,” and “tried not to notice how high up, or how far from the door” (483) he left it.

In this thought experiment, a hypothetical object – the titular Book of Sand – is introduced to show that the unimaginable and unnatural concept of infinity between two points exists in everyday things. Such an intellectual game might initially appear superfluous; after all, everything in the “curved world of our senses” can only be conceived of in the mind as an infinite “sequence of rectilinear contours” (Merrell 17). But the symbol of the book posits a deeper philosophical insight into how we approach the question of infinity in everyday life. We might glean such an insight from the following conversation, where this impossible object is described by the narrator as follows:

[The man] suggested that I try to find the first page.

I took the cover in my left hand and opened the book, my thumb and forefinger almost touching. It was impossible: several pages always lay between the cover and my hand. It was as though they grew from the very book.

“Now try to find the end.”

I failed there as well.

“This can’t be,” I stammered, my voice hardly recognizable as my own.

“It can’t be, yet it *is*,” the Bible peddler said, his voice little more than a whisper.

(Fictions 481-82, italics original)

It is natural that the reader sympathizes with the narrator, for it seems almost logically absurd that “several pages always lay between the cover and my hand” (481). But why is it that the reader feels so? He can simply pick up a ruler that measures some thirty centimeters from end to end, and hold it between two index fingers. The ruler is not the Book of Sand – it does not grow from thirty centimeters to forty while occupying the same amount of space between his fingers. But yet, the reader who is familiar with Borges’s mathematical discourses is at least vaguely aware that between each of the indices on the ruler, between each of the individual atoms that comprise the indices, there exist an infinite number of points. Borges himself notes that space and time, being *continuous*, do not adhere to a convenient delineation like a “series of natural numbers”:

The series of natural numbers is very orderly, that is, the terms that form it are consecutive: 28 precedes 29 and follows 27. The series of points in space (or of instants in time) cannot be ordered in the same way: no number has a successor or an immediate predecessor. It is like a series of fractions arranged in order of magnitude. What number will we count after $\frac{1}{2}$? Not $\frac{51}{100}$, because $\frac{101}{200}$ is closer; not $\frac{101}{200}$, because $\frac{201}{400}$ is closer... (*Non-Fictions*, 117, parentheses original)

And et cetera. In real life, the ruler, whose length appears finite, is not so different from the Book of Sand. But because we have been trained to view objects as discrete, or ultimately comprising a finite number of components, we forget that the spaces between these components remain arbitrarily large. It takes an unnatural construct like the Book of Sand to remind us that the mathematics undergirding reality is more perplexing than we assume.

With this in mind, when we return to the excerpt from “The Book of Sand,” it is apparent that the crux of the short story lies in the Bible peddler’s almost awestruck whisper: “It can’t be, yet it *is*” (*Fictions* 481, italics original). Borges’s italicization of the word “is” stresses the baffling thought that reality can even exist with such logical paradoxes embedded within it, paradoxes that surely undermine what we think of as natural. But, like the peddler who sells the narrator the infinite book, we can do nothing but accept that reality possesses contradictory properties. Borges’s own stance on the topic of logical paradoxes in reality is similarly conflicted. On the one hand, he suggests that these inherent contradictions in space and time indicate that reality is illusory, or perhaps nothing more than an act of mind – in the final line of his essay “Avatars of the Tortoise,” he states that despite us having “dreamt [reality] as firm, mysterious, visible, ubiquitous in space and durable in time... in its architecture we have allowed tenuous and eternal crevices of unreason which tell us it is false” (“Avatars” 4). On the other hand, Butler suggests that Borges is most assuredly “not a mystic (despite the wishes of some of his commentators), but acknowledges that ordinary linear time is the only time we can ever know” (191, parentheses original) – similarly, ordinary, finite matter is the only kind of physical reality we can ever perceive and interact with. Borges’s earlier story, “The Secret Miracle,” best exemplifies this conflicted stance; but, in accordance with Butler’s statement, the divisibility of time as defined in Zeno’s paradox gives way to an almost despairing acknowledgement that time, as we humans experience it, remains ever-flowing and continuous.

“The Secret Miracle” follows the last days of an author named Jaromir Hladik as he faces execution by a German firing squad for his Jewish heritage. Hladik, needless to say, is terrified; he dwells obsessively upon his impending death, which is scheduled to occur in ten days. In his terror, he seeks solace in his own written works: a book called *The Vindication of Eternity*, which

hypothesized “that the number of humankind’s possible experiences is *not* infinite, and that a single ‘repetition’ is sufficient to prove that time is a fallacy”; and the unfinished verse drama *The Enemies*, which “observed the unities of time, place, and action” through the portrayal of its protagonist’s endless “circular delirium” (*Fictions* 159-60, italics original). In a dream, he begs God to grant him an extra year with which to finish *The Enemies* – in another dream, he hears the voice of God declaring that his wish has been granted. On the day of the execution, just before the squad fires, “the physical universe stopped” (161); Hladik, surprised that the world had become motionless, began to compose “in time his grand invisible labyrinth” (162). Unfortunately, just as Hladik composes the final epithet of his play, the extra year that God grants him elapses, and “the fourfold volley felled him” (162).

This story is a difficult one to interpret, because Hladik’s experience towards the end of the story, during which “the physical universe stopped” (161), is decidedly unrealistic – the story may arguably be classed amongst Borges’s more fantastic works. One might posit that Hladik’s wishful philosophizing reaches a climax towards the end of the story, resulting in what only *seems* psychologically like a cessation of time; it is an equally possible interpretation that some form of divine intervention is involved, and that Hladik’s experience is literal. Both conclusions seem equally likely. Instances within the text that echo Zeno’s paradox abound – for example, Hladik’s approach to composing his play seems to involve an ever-dwindling series of minor corrections: “He had finished the first act and one or another scene of the third; the metrical nature of the play allowed him to go over it continually, correcting the hexameters, without a manuscript” (*Fictions* 160). Hladik’s compulsive tendency to correct and re-correct the hexameters of his play parallels the tragic story of the protagonist in the very play he is composing, Römerstadt, whose fate is to remain trapped within a circular temporal loop,

eternally re-experiencing the play's events (160). As he approaches the completion of his play, Hladik "redid the third act twice," "struck out one and another overly obvious symbol," "cut, condensed, and expanded" – even at the very moment when it is explicitly stated that "He completed his play," there remains nonetheless "a single epithet (that) was left to be decided upon" (162). This is an enactment of Zeno's paradox – Hladik, by taking an ever diminishing succession of steps, attempts to deny that time exists.

Critical commentary has thus far been unanimous in agreeing that Hladik manages to complete the play by the end of the extra year granted to him by God.³³ But it has also been mentioned that the significance of Hladik's endeavor lies not in his completion of the play, but in his attempt to defy time – Shaw quotes the line where Hladik "tried to secure himself somehow in the fleeting substance of time" to indicate the man's intention to delay his impending death (37).³⁴ The composition of the play seems nothing more than wishful invention on the part of Hladik to endlessly defer death, drawing upon his own metaphysical arguments on the existence of eternity in both *The Vindication of Eternity* and *The Enemies*, and hoping that these fallacious arguments prove replicable in reality. Merrell points out the similarity between Hladik's predicament and the "prisoner paradox," wherein a lawyer tries, by logical reasoning, to assure a group of death row prisoners that their execution would not come to pass:

It is Sunday. A group of prisoners is told by the warden that they will be executed on one day of the week, and they will not be informed which day it will be until the arrival of that very day, hence it will be a surprise. These prisoners happen to have found a quite astute lawyer. He reasons, after some deliberation, that assuming the warden to have told them the truth, they cannot be executed, for if the fatal day is to be Saturday, then it

³³ See Parker 16, Shaw 37 and Zlotchew 28.

³⁴ This quote is from Shaw's own translation of the original Spanish text; Hurley's translation, which I use, reads: "he tried to buttress his courage somehow on the fleeting stuff of time" (*Fictions* 158).

cannot be a surprise, since it will be the only day remaining. By this mode of reasoning neither can it be Friday, for Saturday now having been eliminated, Friday is no longer a candidate. The same can be said of Thursday, and so on down to Sunday. Therefore they cannot legitimately be executed. (Merrell 40)

Merrell, however, goes on to describe an apparent point of departure between the prisoners' situation and Hladik. The prisoners cannot be convinced by the timeless logic of the lawyer, for it is they, not him, that are scheduled to die: "their emotions having understandably taken precedence over their reasoning faculties, exist in time, hence try as their lawyer may to convince them otherwise, they cannot *reason away* their expectations of an unexpected moment announcing their death" (40, italics mine). Unlike the prisoners, for whom "existence took precedence over logic," for "Hladik... logic took precedence over existence" (42): he manages to "reason away" the continuous and successive nature of time. In other words, Merrell argues that the stopping of time in "The Secret Miracle" is as literal as it is miraculous.

Merrell's reading of the story has its merits, but in my view overlooks a critical part of the story. Despite a compelling analysis of Hladik's reasoning, Merrell seems to forget the final line: "Jaromir Hladik *died* on the twenty-ninth of March, at 9:02 A.M" (*Fictions* 162, italics mine). Hladik's desire to complete *The Enemies* is fulfilled – his desire to use it as a means to postpone death indefinitely, however, is not. Unlike Zeno's paradox, his stasis in time does not last forever; it eventually ends with the firing squad opening fire with fatal consequences. I tend to agree with Shaw's interpretation of Hladik's ultimate fate: although Hladik "sees the completion of his play *Los enemigos* as a potential means of [securing himself in time]," "Borges professes general indifference to, and disbelief in," the possibility of "the triumph of the individual soul over time and death" (37). That Hladik dies – that his fantasy, bestowed as it

were from God, ultimately ends – suggests that logic, however compelling, cannot ultimately supersede reality. As much as Borges himself wished to believe in the validity of Zeno’s argument, he is “not a mystic” (Butler 191) – like any prisoner on death row, Hladik succumbs not only to the executioners’ bullets, but also to time’s inevitable linearity.

If the general view of reality in “The Book of Sand” is that we can zoom in towards any point in space infinitely, and thus prove that any seemingly finite length contains an indefinite number of points, Hladik’s death in “The Secret Miracle” suggests that we cannot do the same with time. We are once again brought back to the insurmountable confrontation between conception and perception. While we are tempted to think of time as infinitely divisible, we are barred by our sense-making faculties from ever taking advantage of this seemingly obvious logical conclusion. If Hladik’s experience of having several minutes of real time drawn out into the span of a year is indeed literal, there is no reason – given the numerous allusions to Zeno’s paradox – why that same amount of time should not be drawn out into eternity. Contrary to what Merrell asserts, “The Secret Miracle” is not a story that affirms Borges’s idealistic streak – if anything, its final conclusion indicates a presence of a *realist* streak that undermines Zeno’s thought experiment. Quite unfortunately for Hladik, the writer who conceived him did not, at that particular instance of writing, harbor any illusions towards eternity and time.

...(I) saw the Aleph from everywhere at once, saw the earth in the Aleph, and the Aleph once more in the earth and the earth in the Aleph, saw my face and my viscera, saw your face... and I wept, because my eyes had seen the secret, hypothetical object whose name has been usurped by men but which no man has ever truly looked upon: the inconceivable universe.

Fictions 283-83

Chapter 4: The Problem of Simultaneity

Can two mutually exclusive events happen at the same time, while occupying the same space? Such an idea is baffling when we think of whether it is possible in reality; it is somehow even more baffling when we think of whether it is possible in terms of narrative. Dorrit Cohn, in her chapter “The Deviance of Simultaneous Narration,” addresses one of the most fundamental aspects of narrative: whether or not “events can *only* be narrated retrospectively” (98, italics mine). Her chapter addresses the apparent paradox of present tense narration, and suggests that critical discourse remains fixated on how a reader’s sense of temporality struggles to come to terms with phrases like “Sighing I lay myself down in the sweet remembered scent of flowers.”³⁵ Her argument wrestles with narrative at the most primary level, that of tense; in other words, it tries to justify if present-tense narration is linguistically and logically viable, or if it somehow conveys a temporal paradox by suggesting that narrative and *narrated event* is happening simultaneously.

Cohn’s paradox of simultaneous narration lies in how the story is organized and presented – much of Borges’s fiction avoids this paradox by always being written in past tense. Nonetheless, the difficulty outlined by Cohn remains pertinent to Borges, because he addresses

³⁵ Cohn 102. This example is quoted by Cohn from J.M. Coetzee’s *Waiting for the Barbarians*; Coetzee II. 92-94.

the issue of simultaneity in different ways. It may even be said that he complicates the Russian Formalists' definition of *fabula* and *sjuzhet*, for the instances of simultaneity in Borges do not lie in his organization of *sjuzhet*, or how the story is told, but are embedded in the *fabula* itself.³⁶ This is the case for two of his stories containing his most well-known symbols: "The Zahir" and "The Aleph." In these stories, both the Zahir and the Aleph are physical objects with the baffling property of being more than one thing at the same time. When we read these stories, we quickly come to the realization that no amount of sequential narration can deprive these two objects of their inherent simultaneity.

In this instance, it is quantum physics that precedes literature. The notion of simultaneity has been foregrounded as early as 1801, when Thomas Young, through the now-famous double-slit experiment, exposed the dual nature of photons – that they can assume two contradictory properties, that of a particle and that of a wave. At the end of a lengthy thought experiment illustrating the problems of confining light to the properties of either a particle or a wave, Einstein and Infeld wrote the following indeterminate conclusion in *The Evolution of Physics*, first written in 1938:

But what is light really? Is it a wave or a shower of photons? Once before we put a similar question when we asked: is light a wave or a shower of light corpuscles? At that time there was every reason for discarding the corpuscular theory of light and accepting the wave theory, which covered all phenomena. Now, however, the problem is much more complicated. There seems no likelihood of forming a consistent description of the phenomena of light by a choice of only one of the two possible languages. It seems as though we must sometimes use the one theory and sometimes use the other, while at

³⁶ The reader may refer to Herman, Jan, and Ryan's definition of *fabula* and *sjuzhet* from the *Routledge Encyclopedia of Narrative Theory*: *fabula* "denotes[s] the chronological sequence of situations and events that can be reconstructed on the basis of cues provided in a narrative text [or the *sjuzhet*]" (157).

times we may use either. We are faced with a new kind of difficulty. We have two contradictory pictures of reality; separately neither of them fully explains the phenomena of light, but together they do! (Einstein and Infeld 262-63)³⁷

The “difficulty” as explained by Einstein and Infeld is both a logical and a philosophical one. It is a logical difficulty because the dual nature of light violates the assumption of mutual exclusivity – an object is assumed to be incapable of simultaneously possessing two properties that contradict one another. It is also a philosophical difficulty because if we were to assume that the duality of particles is the correct interpretation, it would mean that our current framework of logic is insufficient in describing an increasingly complex reality. We would need a new type of logic that embraces simultaneity, contradiction, and multiplicity.

A further example of the attendant difficulties of simultaneity – or, expressed in a more scientific term, *superposition* – involves Schrödinger’s cat, to which I have intimated in the introduction and in Chapter 2. Schrödinger’s cat was Erwin Schrödinger’s tongue-in-cheek way of pointing out the logical difficulties of the Copenhagen interpretation of quantum mechanics – his intention was not to validate the Copenhagen interpretation, but rather to point out its various illogicalities. Broadly described, the Copenhagen interpretation of quantum mechanics that all physical systems are by nature indeterminate – they only acquire their measured properties *during the act of measurement itself*.³⁸ In other words, an *observer* or a measuring system is required to make reality become one way or another, a hypothetical process now termed the “wave-function collapse.” Schrödinger scoffed at such a ludicrous explanation, and offered a caricature of the Copenhagen interpretation, which I reiterate here for the reader’s convenience.

³⁷ For the full thought experiment, see subsection “The Quanta of Light,” Einstein and Infeld 257-65.

³⁸ The Copenhagen interpretation of reality, as I see it, renders Cohn’s paradox a non-issue. If it is indeed a true representation of reality, then events can also be narrated *as* they happen – because the act of narration creates the event narrated.

A cat is trapped in a box with a vial of poison. The vial of poison is discharged according to the decay of a radioactive substance, a scenario which is entirely dependent on chance. If the Copenhagen interpretation is true, posits Schrödinger, then the cat remains in a state of superposition until an observer decides to take a peek inside the box: it possesses the contradictory properties of being both dead and alive at the same time when no one is looking.

Scientists, however, have always been seeking ways to circumnavigate such difficulties without having to dismantle entire systems of logic. The counter-intuitive thought experiment posited by Schrödinger reveals two central difficulties: that reality can somehow exist in a simultaneous state; and that, to resolve this state of simultaneity, reality requires someone to take a look at it before resolving itself from a hazy mess to a more clearly defined state. In 1957, the physicist Hugh Everett proposed a potential solution to Schrödinger's quantum paradox. At its core, it suggests that the wave function collapse triggered by an observation is merely a conceptual complication devised by scientists – in fact, physical systems do not arbitrarily decide to collapse into one eventuality or another. Rather, in an interpretation now popularly called the Many Worlds Interpretation, Everett theorized that *all* eventualities exist, albeit in an infinitude of parallel universes. At each junction where an experiment is conducted, reality branches out into all of its potential outcomes. An observer is not required to make the universe fall one way or another; it simply bifurcates naturally at these specific junction points into ever more multitudes of potential presents and potential futures.³⁹

The Many Worlds Interpretation does away with the problem of the observer, but the idea of having multiple events bifurcating *in parallel* suggests that the idea of simultaneity is more

³⁹ Any explanation of the Many Worlds Interpretation usually oversimplifies (or even overcomplicates) one of its many aspects. This is acknowledged as much in a more recent Forbes article by Chad Orzel, a professor of physics who specializes as a science communicator. His explanation is more in depth than mine and is most certainly more technically accurate. Refer to it at <https://www.forbes.com/sites/chadorzel/2016/01/05/what-the-many-worlds-interpretation-of-quantum-physics-really-means/#421173b11028>.

deeply entrenched in reality than it initially seemed. Borges, in his 1941 story “The Garden of Forking Paths,” readily acknowledges this inevitable conclusion. Tsui Pen’s novel of endlessly bifurcating realities – from which the story ostensibly takes its name – essentially summarizes Everett’s Many Worlds Interpretation and effectively predates it; in fact, it appears as an epigraph in a republished edition of Everett’s doctoral thesis in 1973.⁴⁰ While critical analysis linking Borges with Everett dwells on Everett’s own predilection for the strange, I suggest that, in retrospect, simultaneity is not so bizarre – it is our own limited vocabulary for expressing simultaneity that renders it seemingly unnatural.⁴¹

Symbols of Simultaneity

In a rhetorical figure known as oxymoron, the adjective applied to a noun seems to contradict that noun. Thus, gnostics spoke of a “dark light” and alchemists, of a “black sun.”

Fictions 244

There are no two works more frequently placed alongside one another in Borges’s oeuvre than “The Zahir” and “The Aleph” – as both stories are about objects that appear as impossible amalgamations of others, they lend themselves naturally to comparison. Of them both, Borges himself says the following in the afterword to the collection, also titled *The Aleph*: “In ‘The Zahir’ and ‘The Aleph,’ I think I can detect some influence of Wells’s story ‘The Crystal Egg’ (1899)” (*Fictions* 187, parentheses original).

⁴⁰ Merrell 179.

⁴¹ Merrell states that “Hugh Everett III proposed for his doctoral dissertation what remains perhaps the *strangest* and most novel interpretation of quantum mechanics, now known as the ‘many-worlds interpretation’” (177, italics mine). Orzel’s article suggests, in fact, the opposite – “that Many-Worlds is actually the simplest way to resolve the issues in quantum mechanics that demand interpretations in the first place” (Orzel).

Well's "The Cristal Egg" depicts the egg as a kind of portal offering a glimpse into the alien landscape of Mars – similarly, both the Zahir and the Aleph offer their respective narrators (both coincidentally named Borges) a glimpse of what has hitherto been indescribable by language: a simultaneous vision of contradictory properties, points of perception, and events. The Zahir, which comes by chance into the narrator's hands, is described as "a common twenty-centavo coin" in Buenos Aires; however, "In Gujarat... the Zahir was a tiger," "in Java it was a blind man in the Surakarta mosque," and "in Persia, an astrolabe that Nadir Shah ordered thrown into the sea" (*Fictions* 242). The Aleph is similar, although the narrator's description is more emphatic of its simultaneous nature: "universal space was contained inside [the Aleph]... Each thing was infinite things, because I could clearly see it from every point in the cosmos" (283). Although the general thrust of both stories are quite different – "The Zahir," for instance, adopts a serious tone conveying the narrator's increasing obsession with the enigmatic object, while "The Aleph" is playful, almost comical – they possess similar themes. The role of the observer in each story is important, as is the idea that within the Zahir and the Aleph lay an unlimited range of potential futures.

By pointing to how they condense a seeming infinitude of information into a single point, Merrell suggests that the Aleph and the Zahir are analogous to space-time singularities.⁴² On the contrary, I suggest that a more pertinent scientific concept is the wave-particle duality in quantum physics. Let me qualify this statement further. While Borges may not have had this exact concept in mind when he was writing "The Zahir" and "The Aleph," he was nonetheless certain about conveying two things: the first, that reality appears different depending on the observer; the second, that since it is constantly branching towards an innumerable number of

⁴² In other words, Merrell is comparing the Aleph and the Zahir to black holes. Specifically, he refers to a theoretical type of black hole wherein one can still perceive information about what lies inside – such a singularity is called a "naked" singularity. See Merrell 145-50.

possible futures, it might be regarded as having those futures already latent within the present, simply waiting to happen. This calls to mind Thomas Young's original double-slit experiment investigating the behavior of the photon, and its attendant and subsequently elaborated implications. The implications of this experiment, as later explained by physicists such as Werner Heisenberg and Richard Feynman, are as profound as it is mysterious. The experiment does not only reveal that a photon has both the properties of both a particle and a wave, but also reveals that the observer plays a role in determining if a photon exhibits particle-like characteristics or wave-like characteristics. If one looks at a photon mid-flight, it resembles a particle; if he looks at the *results* of its impact, he notes that they are scattered in a wave-like manner, rather than isolated dots that a stream of particles would create.

All of this sounds very technical, and it is certain that none of the technicalities crossed Borges's mind when he was composing either of the stories. But what did cross his mind was a keen, intuitive sense that the appearance of reality is dependent on the consciousness of those inhabiting it, and that furthermore, until the actions of a person shifts reality one way or another, reality might be taken as *the combined state of all of its possibilities*. We see both of these ideas arise in "The Zahir." The first idea is evident in how the Zahir appears in various contexts – across different cultures, it can appear as a coin, a tiger, a blind man, an astrolabe, "a small sailor's compass," "a vein in the marble of one of twelve hundred pillars," or "the bottom of a well" (*Fictions* 242). Only to the narrator Borges, who is embedded within the culture of Buenos Aires, does it appear as a "twenty-centavo coin" (242). The second idea of the Zahir as a locus of all potentialities appears in Borges's own rumination about its appearance to him as a coin, just shortly after he happens to come across it:

Possessed, without a trace of sleepiness, almost happy, I reflected that there is nothing less material than money, since any coin (a twenty-centavo piece, for instance) is, in all truth, a panoply of possible futures. *Money is abstract*, I said over and over, *money is future time*. It can be an evening just outside the city, or a Brahms melody, or maps, or chess... Adherents of determinism deny that there is any event in the world that is *possible*, i.e., that might occur; a coin symbolizes our free will. (I had no suspicion at the time that these “thoughts” were an artifice against the Zahir and a first manifestation of its demonic influence.) (*Fictions* 244-45, italics and parentheses original)

The narrator Borges is not merely reflecting about the possibilities of currency. His thoughts have been aroused by the presence of the Zahir, as indicated in the final line of the quote – all of his conjectures from this point onwards are regarding the Zahir, as he falls ever more deeply under its influence. The word “panoply” is critical in reading this passage, as well as understanding the underlying philosophy. Before the Zahir (as a coin) is spent, it exists as a superposition of possibilities. The narrator goes on to state that this potentiality is what makes the Zahir a symbol of “our free will” (245) – as though to demonstrate the truth of his statement, the narrator tries to dispose of the Zahir by going into a tavern and spending it.

The links between this passage and the intricacies of quantum physics are numerous. In particular, it bears upon the decades old debate about whether quantum indeterminacy overrules Newtonian determinism and restores the validity of free will. Richard Feynman states quite bluntly that one of the unintended side effects of quantum mechanical experiments, in particular the ones involving the wave-particle duality, was that they gave rise “to all kinds of nonsense and questions on the meaning of freedom of will, and of the idea that the world is uncertain” (ii-9). As cynical as Feynman was about philosophy and of its relationship to physics, he

acknowledged as much that the current state of indeterminacy in physics naturally results in such questions. Broadly speaking, the general consensus is that quantum physics entertains free will, as choice is an important element affecting the outcome of most of its experiments. If the scientist chooses to measure a photon as it is passing through one of the two slits in the double-slit experiment, he finds it a particle; if he measures it as it lands on a surface, he finds that it passes through both slits at once in a wave-like manner. The action of the experimenter seemingly determines the outcome of the experiment. This is also the case for the narrator in “The Zahir” – when it is unspent, the Zahir remains “a panoply of possible futures” (*Fictions* 244). But after it is spent, the Zahir becomes entrenched in the narrator’s mind as the image of a coin, to haunt him for the rest of the story – it loses its multiplicity and becomes a singular, determinate object.

Of course, one might argue that the same happens in all narratives – don’t all narrators make choices that solidify their indeterminate present into a determinate future? Certainly that is the case, but few stories are as explicit as “The Zahir” in describing the manifold nature of the present, and how choice plays a part in transforming that manifold nature into a singular one. The Zahir, initially described as an object with various simultaneous properties, becomes only a coin in the narrator’s mind – it is as though by spending it, he confirms, physically and psychologically, its permanent *coin*-ness. The Zahir, then, is not so different from a photon, or of any type of atom according to the laws of quantum physics. The narrator Borges intimates at the end of the story that the Zahir has become, for him, reality itself: “Others will dream that I am mad, while I dream of the Zahir. When every man on earth thinks, day and night, of the Zahir, which will be dream and which reality, the earth or the Zahir?”⁴³ For the reader, it is already evident that the Zahir is meant to be analogous to an atom: a constituent and a representation of

⁴³ *Fictions* 248-49.

reality at large. Furthermore, in analyzing its symbolism, we confront the view that reality is also to some degree *mind-dependent* – even as the present exists in a state of multiplicity, our conscious choices dictate the direction of the immediate future.

Borges was at this point in his writing career crafting a language with which he could use not only to describe simultaneity, but also to embody it – to preserve all of its rich complexity in a single, epiphanic moment. This language reaches the height of its polish in “The Aleph.” The story relates a humorous tale in which the narrator – again called Borges – strikes an unconventional friendship with the father of a late woman he admired, Carlos Argentino Daneri, who happens to be a literary dilettante. Daneri aspires to compose an epic describing all of reality, down to its most mundane details – an ambition upon which the narrator Borges regards with disdain. Eventually, the source of Daneri’s creative ambition is revealed to Borges: hidden in Daneri’s cellar is an object called the Aleph, which he describes as “the place where, without admixture or confusion, all the places of the world, seen from every angle, coexist” (*Fictions* 281). Borges, accepting Daneri’s invitation to view it, discovers that the Aleph is indeed a point in which all other points across space and time are contained.

What is striking about this story is not merely the conception of the Aleph, but rather how the narrator Borges chooses to describe it. As with the case of the Zahir, this description involves a lengthy list of what the Aleph is, and can be, but is prefaced with a philosophical exposition about the limitations of language in trying to describe such an object:

I come now to the ineffable center of my tale; it is here that a writer’s hopelessness begins. Every language is an alphabet of symbols the employment of which assumes a past shared by its interlocutors. How can one transmit to the others the infinite Aleph, which my timorous memory can scarcely contain? In a similar situation, mystics have

employed a wealth of emblems: to signify the deity, a Persian mystic speaks of a bird that is somehow all birds; Alain de Lille speaks of a sphere whose center is everywhere and circumference nowhere... In that unbounded moment, I saw millions of delightful and horrible acts; none amazed me so much as the fact that all occupied the same point, without superposition and without transparency. What my eyes saw was *simultaneous*; what I shall write is *successive*, because language is successive. (*Fictions* 282-83, italics original)

This passage is dense and contains numerous references, not only to Borges's own story "The Library of Babel," but also to the Simurgh from Iranian mythology.⁴⁴ More importantly, Borges acknowledges the limitations of the very language he uses, which I see as a crucial narratorial technique in the attempt of describing the Aleph, which grants the viewer a vision of the cosmos from every possible perspective, and in every possible moment. In acknowledging the limitations of temporality, Borges positions the reader to perform the task of imagining a series of "successive" events as a single instant of all of them happening at once. This logical hoop is a critical one through which the reader must jump, for it serves as a mental exercise of sorts to dispel the limitations of traditional sequential narration that Dorrit Cohn identifies, and which Borges eloquently summarizes: "Every language is an alphabet of symbols the employment of which *assumes a past shared by its interlocutors*" (*Fictions* 282, italics mine).

Richardson states that "In a natural, realistic, or mimetic narrative, the syuzhet of a work is always linear" (59); he provides instances of unnatural narratives which convey a "simultaneity effect," such as Joyce Carol Oates's "The Turn of the Screw," which uses "two parallel columns to disclose the simultaneous thoughts of separate individuals in her story" (60).

⁴⁴ The Simurgh is featured prominently in the 1177 Persian poem *The Conference of the Birds*. The Simurgh, in the poem, is described as simultaneously a mirror reflecting the thirty birds that came to seek him, and as an amalgamation of all of them (Attar 235, trans. Afkham Darbandi and Dick Davis).

By his definition, Borges's description of the Aleph, especially the parts after the above paragraph, consists of a "natural, realistic, or mimetic narrative" (59). For certainly, the narrator Borges goes on to list the things he saw in the Aleph, in the usual sequential manner, and moreover in past tense. But because of the preface I have quoted above, the reader is under no illusion that Borges's sequential list is in any literal sense sequential. Contrary to other postmodern narratives that Richardson lists, which try to convey linear story events using a nonlinear mode of narration, Borges does the exact opposite: he conveys a nonlinear story event (in the form of the narrator's experience of the Aleph) using a linear mode of narration. There is a particular reason why Borges chooses to do it this way, and we might find it in the phrase "because language is successive" (*Fictions* 283).

Traditional means of denoting simultaneity nonetheless relies on sequential language, especially when it comes to scientific communication. It is arguable that resistance towards quantum theory, especially during its formative years, might be traced towards the linguistic and logical assumption that contradiction and simultaneity are forms of paradox and should be considered wrong, or at least unnatural. We see this even in modern discourse – Alber, for instance, holds the view that if an event violates "accepted principles of logic (such as the principle of noncontradiction)," it has to be considered realistically "impossible" outside the realm of fiction (Alber 25, parentheses original). What Borges does is critique the limitations of language in describing reality, and of the preconceptions it inculcates in the users of that language. Note that scientific language makes use of words such as "superposition," if only to render an otherwise unthinkable concept thinkable – the underlying implication of quantum discourse is that contradictory events are not happening simultaneously, but are somehow fused together. "The Aleph," in contrast, does away with such pretension: nothing amazes the narrator "so much as

the fact that all occupied the same point, *without* superposition and without transparency” (*Fictions* 282, italics mine).⁴⁵ There is nothing ambiguous about the narrator Borges’s experience: he is experiencing all possible positions in space and moments in history without them somehow overlapping, as the word “superposition” suggests. If Borges is indeed trying to make a point about Western language and logic here, then his point no doubt indicates that some sort of paradigm shift is required in order to fully appreciate and describe a reality has been repeatedly shown to be less linear than previously thought. If logic had developed along the lines of having embraced simultaneity, there may have been no need for conceptual complications such as “quantum superposition” or, as Hugh Everett argued against in his doctoral thesis, the perplexing phenomenon of “wave function collapse.”

Mechanics of Bifurcation and the Two-Part Labyrinth of Discovery

Unlike Newton and Schopenhauer, your ancestor did not believe in a uniform and absolute time; he believed in an infinite series of times, a growing, dizzying web of divergent, convergent, and parallel times.

Fictions 127

In his essay “Borges and the Multiverse: Some Further Thoughts,” Dominic Moran gestures towards the significant pool of critical commentary pointing out the resonance between “The Garden of Forking Paths” and Hugh Everett’s Many Worlds Interpretation, the latter of

⁴⁵ In order to confirm that the word “superposition” is a deliberate choice on the part of Borges, rather than an artifact of translation, I have consulted the original Spanish work. The original line reads “En ese instante gigantesco, he visto millones de actos deleitables o atroces; ninguno me asombró como el hecho de que todos ocuparan el mismo punto, sin *superposición* y sin transparencia” (Borges 8, italics mine). Spanish text retrieved from <http://www.bcnbib.gov.ar/uploads/posts/El-Aleph.pdf>.

which would only be formulated later in 1957.⁴⁶ Existing commentary dwells excessively on the uniqueness of Borges's creative vision, Moran argues, when the inspiration for that vision can be traced even further back in history, to Olaf Stapledon's science fiction classic *Star Maker* and to the 18th century Chinese novel *Dream of the Red Chamber*, which "The Garden of Forking Paths" explicitly mentions (Moran 928-30). Moran presents a compelling argument – if this indeed is the case, then Borges's central endeavor in "The Garden of Forking Paths" is not merely to show off an avant-garde literary device, but also to highlight the lack of a poetics of simultaneity in mainstream Western literature, a poetics which Chinese and even Persian literature had already come to embrace.⁴⁷ Even before "The Aleph" came to be written, Borges was already toying with the issues of simultaneity and choice, which for him constituted the elements of a metaphysical, rather than physical, labyrinth.

In many ways, as an example of Borges's earlier work, the narrative devices present in "The Garden of Forking Paths" are more complex and intricate than in later work such as "The Aleph," which may have influenced critics in describing it as a precursor to Everett's theory. The story's protagonist, spy and professor Yu Tsun, comes across his ancestor Ts'ui Pen's work of unconventional fiction in the possession of sinologist Stephen Albert. This novel, Albert tells him, seeks to portray not linear time, but simultaneous and bifurcating time (*Fictions* 127). Any moment of the present, in Ts'ui Pen's novel, leads to multiple and often contradictory versions of the future – Yu Tsun remembers, for instance, that in "the third chapter the hero dies, yet in the

⁴⁶ Modern physicists have acknowledged as much: see an interview with physicist Sean Carroll in *Discover*, at <https://www.discovermagazine.com/the-sciences/quantum-physics-is-no-more-mysterious-than-crossing-the-street>. Like Moran, Carroll cites both Borges and Stapledon as predating Everett.

⁴⁷ Moran diligently mentions that before Borges, Stapledon had already conceived of a kind of creature existing in time rather than in space, which allowed it walk all possible paths of an ever-branching future simultaneously (Moran 929, Stapledon 243). However, Stapledon's work is considered to be an early instance of *hard* science fiction, which in Moran's view, while scientifically significant, "are all but unreadable *as literature*" (931, italics original).

fourth he is alive again” (*Fictions* 124). To explain this apparent paradox, Albert describes the mechanism of temporal bifurcation in the novel as follows: “(In the novel) the character chooses all [possibilities.] *He creates*, thereby, ‘several futures,’ several *times*, which themselves proliferate and fork. That is the explanation for the novel’s contradictions” (*Fictions* 125, italics original).

The statement by Albert succinctly summarizes the Many Worlds Interpretation, in which the present is always a branching point for an infinite number of possible futures. Yet, in comparison with the vast corpus of unnatural fiction that has since been produced, we might note that Borges actually shied away from pushing the boundaries of narration to its absolute limit. When put against some of Richardson’s examples of modern fiction that further complicate the idea of variable narratives – such as Robert Coover’s “Heart Suit,” which presents a short story in a deck of cards awaiting shuffling, or Malcolm Bradbury’s “Composition,” in which the reader gets to choose the story’s outcome – “The Garden of Forking Paths” actually appears rather tame from a narratorial standpoint.⁴⁸ Instead of having the reader experience the unfolding of Ts’ui Pen’s novel first hand, Borges has him merely read about it secondhand. One may ascribe it to the simple fact that unnatural narratives, during the 1940s, constituted a relatively new subset of the literary spectrum, and that techniques of extreme narration had not yet been seriously considered as a necessary evolution of the literary aesthetic. However, I would venture the viewpoint that, as are the rest of the stories compiled in *The Aleph*, the structure of “The Garden of Forking Paths” is an example of one of the writer’s intricate literary artifices meant to draw attention to an aspect of the world by imitating it. Lest this statement appears too superficial, I qualify it on the grounds that it is not simply reality that is being imitated, but also the way reality is experienced, thought about, and written of. On the one hand, we have Ts’ui

⁴⁸ See Richardson 61-63.

Pen's novel, which no doubt prefigures a more or less scientifically accepted view of the world posited by Everett. On the other hand, we have Albert's historical account of how Ts'ui Pen came to conceive of the novel. Albert describes in detail Ts'ui Pen's methodology, which sprung initially from an ambition to "compose a book and a labyrinth" – an ambition so powerful that he "renounced the pleasures of oppression, justice, the populous marriage bed, banquets, and even erudition" in order to see the project to its final culmination (*Fictions* 124). He intended "to construct a labyrinth which was truly infinite" – to his end, he made his book the medium through which the labyrinth is expressed (124).

This double layered approach to storytelling on the part of Borges – the first layer being Ts'ui Pen's effort in constructing his novel, and the second layer being the contents of Ts'ui Pen's novel itself – betrays the story's meaning. Ts'ui Pen shows us that the artist and the scientist are more similar than they are different – the novel, his artistic creation, is simultaneously a *discovery* of a way of expressing reality. Shaw repeatedly reminds us that for Borges, the labyrinth is not merely a device to complicate reality for aesthetic purposes; it is, for him, the only accurate means through which reality can be embodied.⁴⁹ Ts'ui Pen initially struck forth to create the ultimate labyrinth in which one could wander forever; but he quickly discovered that a "physical labyrinth" was insufficient for such a purpose (*Fictions* 124). It dawned upon him subsequently that the key to creating an infinite labyrinth lay in the very fabric of everyday existence – in the idea that choices made at every moment affect the course of the future. If a person is confronted with the choice of taking the left path or the right in a spatial labyrinth, is he not also forced to make the same kind of choice as in a temporal one – with the added complication of having infinitely many subtle variations?

⁴⁹ See Shaw 4, 14-15. Shaw notes that Borges operates on "the idea that comprehension of reality can be founded on rationalistic recognition of straight lines of cause and effect no longer holds good" (15).

Ts'ui Pen thus discovers that reality already constitutes the labyrinth he dreamed of – he merely had to present it in text. This act of preserving a bifurcating reality in text, I argue, is the true hallmark of Ts'ui Pen's coincidence with the discovery of Hugh Everett, rather than the described contents of the novel itself. In the story, Albert notes that “In all fictions, each time a man meets diverse alternatives, he chooses one and eliminates the others” (*Fictions* 125). But as Ts'ui Pen's novel is committed to text – to the materiality of physical pages – his fiction does not function like the usual linear narrative, as *all pages containing various possibilities exist physically and simultaneously*. Even if one choice is taken, all the other choices remain in existence, albeit in different narrative timelines. This simple narrative detail, which in the story results in Albert's initial confusion regarding the nature of Ts'ui Pen's novel, brings it fully in line with Everett's interpretation of quantum theory. While Niels Bohr and Werner Heisenberg contended in the Copenhagen interpretation of quantum mechanics that reality collapses one way or another when an observer interacts with it, Everett does away with this phenomenon altogether. Everett argued in favor of a more elegant universe wherein all realities existed in parallel, rather than having a single, linear reality that behaves in an arbitrary, probabilistic manner when confronted with multiple eventualities.

Stephen Albert's explanation of Ts'ui Pen's labyrinthine novel to Yu Tsun is perhaps unnecessary: the proof of Ts'ui Pen's elegant formulation of reality lay already in the material presence of the “chaotic manuscripts” containing “contradictory chapters” (*Fictions* 124, 125). While Albert himself does not quite realize it, it is apparent within the story that Ts'ui Pen's quest towards creating the novel – or discovering it – is arguably more important than the structure or contents of the novel itself. The novel, as it was initially uncovered by the narrator Yu Tsun's ancestors, was said to be nothing more than a “contradictory jumble of *irresolute*

drafts” (*Fictions* 124, italics mine). One might infer from the phrase “irresolute drafts” that Ts’ui Pen came across the full concept of a temporal labyrinth *during the process of writing the book itself*. The creative process of Ts’ui Pen, as I shall piece together from the conversation between Yu Tsun and Stephen Albert, likely went like this. He set out first with two distinct goals: first to write a book, and second to create a labyrinth. He realizes that to create the ultimate labyrinth, he has to forge it in time – seeing that the novel is a sequential genre, he decides to make both projects one and the same.⁵⁰ He makes several drafts of the novel, only to realize that temporally linear form of the genre is not only insufficient, but also fundamentally prevents the creation of a temporally unrestricted labyrinth. Faced, however, with his existing but contradictory drafts, Ts’ui Pen chances upon the idea that these drafts need not be discarded; instead, they may be used as parts of very labyrinth he is trying to create, which bifurcates and proliferates across time...

It is needless to go on further; Ts’ui Pen’s quest, when viewed from this perspective, parallels the scientist when his discipline undergoes a paradigm shift – a rare process in science wherein the fundamental principles of a particular sub-discipline gets replaced by new ones. A paradigm shift had been necessary for scientists to acknowledge and commit to formula the existence of chaotic behavior; it also precipitated scientific recognition of the presence of indeterminacy at the scale of particles. Often, such a radical shift in the worldview of the sciences emerges from what seems at the beginning like experimental error – that measurements of complex systems only *vaguely* obeys predictive models, for instance, or the observation that light is sometimes a wave and sometimes a particle.⁵¹ Similarly, the subtext in “The Garden of

⁵⁰ Forging a literary work *in time* is a uniquely Borgesian concept – as we may remember, Hladik attempted the very same in “The Secret Miracle.”

⁵¹ In his description of the role of paradigm shifts in science in the essay “The Function of Dogma in Scientific Research,” philosopher of science Thomas Kuhn quotes Francis Bacon: “Truth emerges more readily from error

Forking Paths” seems to indicate that Ts’ui Pen’s titular labyrinth emerged from the sheer number of “irresolute drafts,” which created the basis for the concept of an ever-forking present. In such a reading, his creative process seems evocative of the trajectory traced by 20th century science. As we will see in the next chapter, Ts’ui Pen’s journey is not the only of such described by Borges; there are still other stories which re-create, with extreme nuance, the subtleties of humanity’s quest for knowledge.

than from confusion” (357). Error is important, but only when encountered successively in methodical, directed research. The idea of paradigm shifts is attributable to Kuhn.

To be scientific is, among other things, to be objective and open-minded. Probably none of us believes that in practice the real-life scientist quite succeeds in fulfilling this ideal.

Kuhn 347

Chapter 5: At the Foundations of Knowledge

A large number of Borges's short stories seek to convey just one of many puzzles in reality; a few others, comparatively rarer, comment generally on the wider enterprise of knowledge – what we, as a species, seek to know and how we go about knowing it. These stories, even if they do not constitute the bulk of Borges's fictions, are tremendously important not only in providing the reader with a glimpse of the philosophy of knowledge, but are also crucial in understanding the rest of Borges's body of work. Speaking of one of Borges's longest and most complex tales, "Tlön, Uqbar, Orbis Tertius," James Irby suggests that "[i]t may even be said that they constitute the principal ingredients of the prose style of Jorge Luis Borges" (411).

In the two stories that I will proceed to analyze for this final chapter – "Tlön, Uqbar, Orbis Tertius" and "Death and the Compass" – we may indeed see some of the DNA from which the rest of Borges's stories are made. Infinity shows up, as does recurrence, chaos, and other visions of the unimaginably labyrinthine. The crucial difference is that in these stories, the mechanics of the various scientific elements are secondary to the larger epistemological enterprise that creates them. Borges plays a little bit looser with his symbolism – no longer do individual parts of the story correspond to particles, probabilities, or numbers; instead, they are relatable to social institutions, how they work, and with what purpose. As I have hinted at in my introduction, "unnatural realism" is no longer entirely adequate in describing Borges's narrative method for these stories. Instead, readers are returned to the realm of the fantastic and the

speculative in order to re-appreciate the world as a network of knowledge-producing relationships, as well as its attendant drawbacks, with Borges's most direct and effective literary technique: defamiliarization.

Philosophers of science have long since been commenting on the manner of humanity's quest for knowledge, as well as its efficacy. Thomas Kuhn describes the institution of science as fundamentally different from that of art or the humanities – instead of relying on classics such as “the works of a Shakespeare, a Rembrandt, or an Adam Smith,” science relies on paradigms. Kuhn defines paradigms as “a fundamental scientific achievement and one which includes both a theory and some exemplary applications to the results of experiment and observation. More important, it is an open-ended achievement, one which leaves all sorts of research still to be done” (358). More precisely, paradigms constitute a body of *verified knowledge* from which further discoveries can be built upon without the extra effort having to retread old ground. Knowledge, as it pertains to science, is sedimentary – newer, more pertinent layers are usually built on top of the old ones.

Kuhn identifies both strengths and weaknesses inherent in such a structure. The most apparent strength, of course, is that research founded upon paradigms tend to be more incisive and directed – instead of fumbling about in the dark like their forebears, newer generations of scientists know where to look and how to look, thereby reducing wasted effort, time, and most importantly, funds. The weaknesses, however, are just as apparent: because “the practitioners of a mature scientific specialty are deeply committed to some one [*sic*] paradigm-based way of regarding and investigating nature,” the scientist can become trapped by his or her own preconceptions. I have described this social phenomenon in my chapter on chaos: because the scientist must be extremely careful when it comes to “discriminat[ing] essential anomaly from

mere failure” (Kuhn 365), he falls into the trap of becoming so careful that he begins, subconsciously, to make results fit the existing model. Anomalies detected in experiments, as Gleick points out, are usually dismissed as fluff across all of the sciences that rely on hard data. The same happens for observations that fall too far out of the intuitions of existing paradigms – if a particle starts to show some fuzziness in terms of one measurable attribute or another, it could be a problem with the resolution of the detector. It is easier, notes Kuhn, to make results conform to theory, as opposed to the other way around; in fact, it is often seen as a hallmark of diligent science-making.⁵²

The scientist, then, is not quite “objective and open-minded” (Kuhn 347) – while the ideals of his profession seemingly prefers that he is, the reality of the sciences as they exist *in relation to* established paradigms, global trends, and the ever-growing desire for profit-making much rather prefers that he is not. Jean-François Lyotard, in his book *The Postmodern Condition*, intimates that science over the course of the 20th century has become beholden to the products of its own advance – capitalism and technology increasingly dictate that science does not produce crunchable data for the sake of validating some distant truth about the world; instead, data is produced for the sake of data production itself, in a seemingly tautological endeavor of affirming that science can create increasingly precise measuring tools.⁵³ Measurement appears to have become a legitimizing goal for science in and of itself, at the behest of technological fetishism. While this, in my view, does not necessarily impugn the original goal of knowledge production, it does suggest that science is no less susceptible than other fields to human bias, human desire, and above all human will. Borges comments directly on this aspect of any knowledge-based discipline in “Tlön, Uqbar, Orbis Tertius” and “Death and the Compass” – in the former, he

⁵² See Kuhn 366-67.

⁵³ See Lyotard’s chapter “Research and Its Legitimation through Performativity,” 41-47.

envisioning an alternate world wherein its historians and scientists do not search for evidence, but *create* them through imagination; in the latter, a detective is led by the man he pursues into a metaphysical labyrinth created out of his own preconceptions. As has become a recurring theme throughout this thesis, it should be noted that Borges's fictional intimations predate both Kuhn's and Lyotard's most incisive philosophical works by some few decades.

Defamiliarizing Knowledge

Ten years ago, any symmetry, any system with an appearance of order – dialectical materialism, anti-Semitism, Nazism – could spellbind and hypnotize mankind. How could the world not fall under the sway of Tlön, how could it not yield to the vast and minutely detailed evidence of an ordered planet?... Tlön may well be a labyrinth, but it is a labyrinth forged by men, a labyrinth destined to be deciphered by men.

Fictions 81

"Tlön, Uqbar, Orbis Tertius" has many themes, but the above epigraph sums up its most pertinent: that man, and by extension his institutions, can fall prey to patterns of behavior. Tlön is perhaps Borges's most inventive literary artifice, corresponding to no part of nature – it may at best be described, literally, as a parallel Earth in which logic has developed in the exact opposite fashion from that of our world. Instead of objectivism, the citizens of Tlön worship idealism; instead of linear causality, they advocate that instances in time exist independently of one another (*Fictions* 74). The science of Tlön contradicts our very notion of what science should be – in fact, it is a world wherein the humanities dominate culture, rather than the sciences. The world of Tlön is described quite explicitly by the narrator (again, a narrator named Borges) to be

fictional, even within the boundaries of the story: “It is conjectured that this ‘brave new world’ (Tlön) is the work of a secret society” of learned men guided by a single mastermind (*Fictions* 72). This fictional world, set within a very real Earth, serves two functions. The more obvious one is that it is a parody of our sciences. The less obvious function – the meaning of which comes through in the story’s “Postscript” – is to illustrate how, ironically, our sciences still demand a hypothetical construct like Tlön to justify its own processes. For Tlön is, at the end of the day, a comprehensive *catalog*, a system of thinking, an ultimate object of scientific pursuit.

“Tlön, Uqbar, Orbis Tertius” may be summarized as follows. The narrator Borges, through an exchange with his friend Adolfo Bioy Cesares, comes across a fictional country known as Uqbar. In an attempt to trace its origins, Borges uncovers not only a chapter, but an entire encyclopedia of a *planet* called Tlön, of which Uqbar is only a part. He proceeds to describe the language, customs, and society of Tlön over the next few pages, and notes how alien its social structures are compared to that of Earth’s. After that, in the lengthy postscript of the story, the narrator Borges details how the imaginary world of Tlön, thought at first to be a human invention, slowly begins to invade reality. Tlönian historical artifacts, called *hrönir*, begin to be discovered in the real world. Eventually, Tlönian culture begins to infect human society: “Numismatics, pharmacology, and archaeology have been reformed... (and) that biology and mathematics are also awaiting their next avatar” (*Fictions* 81). As the world slowly becomes Tlön, Borges retires to a “hotel in Adrogué,” and embarks on “revising an indecisive translation in the style of Quevedo of Sir Thomas Browne’s *Urne Buriall*” (81).

Hidden within this layered narrative is an equally layered critique on humanity’s institutions of knowledge. As one of the most discussed texts of Borges, critical opinion emphasize one or another aspect of the story, but they all agree on its plurality. It is difficult,

even so, to draw focus to one element of the story, because other parts of the story work to undermine any such isolated interpretation – Irby points succinctly to the multiple traps laid within the story in the following statement: “Already a kind of palimpsest, a many-layered paraphrase of other paraphrases, the tale tends to make any critical résumé and commentary both desperately tautological and inaccurate, for at every turn one is also faced with sly reversals and subversions of the very schemes that the work sets forth” (413). My reading of “Tlön, Uqbar, Orbis Tertius,” then, might inevitably fall into this trap. However, I will nonetheless venture the hopefully holistic view that the encyclopedia describing Tlön is analogous to the modern world as a network of knowledge-producing institutions, even if it is an extremely distorted one – for it takes an extreme degree of defamiliarization for the reader to recognize the grand scheme of things he is enmeshed in and has been taking for granted. Note that keyword is knowledge *production*, rather than knowledge *discovery*, a point that I will shortly get to.

It is important to make note of how Borges sets the story up for the reader’s final appraisal. What is it like to live in a society fundamentally premised upon idealism, where the world is seen as nothing but a mental construct? Such a society appears radically different at first glance, but possesses eerie similarities thereafter. The first difference is that of language: in Tlön, “[n]ouns are formed by stringing together adjectives,” which results in “a literature... filled with ideal objects, called forth and dissolved in an instant” (*Fictions* 73). There are even “poems composed of a single enormous word; this word is a ‘poetic object’ created by the poet” (73). Language, which is the foundation upon which all institutions of knowledge are erected, is already used in a quite different way: instead of having individual nouns denoting different types and categories of objects, words are invented on the fly depending on the present state of the

object being described.⁵⁴ Having already described a language whose philosophy is so different from ours, Borges proceeds to outline the implications of that language upon other fields. “This thoroughgoing monism, or idealism,” he writes, “renders science null” (74). In that void created by the absence of science, the closest approximations are metaphysics and psychology – the latter of which is used to study how people perceive the world, rather than what the world *is*.

We now have an idea that Tlön is a society built upon the subjective impressions of its people – but then Borges takes it a step further: “Century upon century of idealism could hardly have failed to influence *reality*” (77, italics mine). The hopes and desires of Tlönians eventually bleed out beyond their psychological boundaries and affects reality itself. Objects of thought, called *hrönir*, begin to be excavated – instead of being properly historical objects, *hrönir* are artifacts shaped by the finder’s will. This changes the field of archaeology in Tlön permanently, for instead of finding objects left behind from a certain era, excavators find *what they wish to find*:

The warden of one of the state prisons informed his prisoners that there were certain tombs in the ancient bed of a nearby river, and he promised that anyone who brought in an important find would be set free. For months before the excavation, the inmates were shown photographs of what they were going to discover... The systematic production of *hrönir* has been of invaluable aid to archaeologists, making it possible not only to interrogate but even to modify the past, which is now no less plastic, no less malleable than the future. (*Fictions* 77-78)

Archaeology in Tlön is clearly the opposite of archaeology on Earth: instead of being a field premised upon historical fact, the Tlönian allows for historical bias, latent desire, and even an

⁵⁴ Borges provides an example of how the language works: “‘The moon rose above the river’ is ‘*hlör u fang axaxaxas mlö*,’ or, as Xul Solar succinctly translates: *Upward, behind the onstreaming it mooned*” (*Fictions* 73, italics original).

implicit drive towards profit to encroach upon a seemingly objective field, as shown by the “systematic production” of *hrönir*. Knowledge is not discovered, but rather produced; it has, in Tlön, become something of an industry.

The turning point of the story – from which it makes the transition from mere fantasy to social commentary – lies in the “Postscript,” the final section of “Tlön, Uqbar, Orbis Tertius” which also serves as its frame story. Several revelations are unveiled at this point. The man behind Tlön was not a “shadowy man of genius” (*Fictions* 72), as was initially thought – instead, he is the “reclusive millionaire Ezra Buckley” (78), who is variously described as materialistic, exploitative, and egoistic: “the kind of man who would build factories, not the type that would write encyclopaedias of imaginary worlds” (Pozueta 214). After that, Tlön – formerly an imaginary project – becomes a phenomenon in the real world: *hrönir* begin to be uncovered across various countries. Amongst them are a Tlönian compass, a cone of an unknown metal, and finally, forty volumes of *The First Encyclopaedia of Tlön* (*Fictions* 80). The appearance of the *Encyclopaedia* proved to be the breaking point of the imminent intersection between the two worlds: mankind’s objective sciences give way to Tlönian idealism, and human language is supplanted by the language of Tlön.

Woven within this winding account are several points of interest that resonate with the later discourse of Kuhn and Lyotard. Even as Tlön appears remarkably alien, the process through which *hrönir* are uncovered bears a striking similarity to what Kuhn describes as the modern scientist’s “deep commitment to a paradigm” (363). If we find the Tlönians’ creation of historical artifacts to be laughable in terms of our sensibilities, do we then stop laughing when we realize that it is the norm for scientists to make results conform to existing paradigms? Kuhn proceeds to note that this mentality in and of itself is not a shortcoming of science – in fact, it is

“fortunate that that commitment (to a paradigm) is not lightly given up,” for it exemplifies academic rigor and for the most part does “at last succeed in producing within the paradigm a solution to even the most stubborn problem” (363). It only becomes a concern when commitment to a paradigm is motivated by something other than the search for scientific truth. One of these forces of motivation, as Lyotard notes somewhat apocalyptically, is capitalism. Science has become reliant upon funding, and the resultant effect is that “[t]he games of scientific language become the games of the rich, in which whoever, in which whoever is wealthiest has the best chance of being right. An equation between wealth, efficiency, and truth is thus established” (45).

The realization that an *impure* drive towards knowledge even exists shows up at two points in the story. The first is the warden who directs his prisoners to unearth *hrönir* for the purposes of their mass production – he provides them directives in the form of “photographs of what they were *going to discover*” (*Fictions* 77). The second instance, as Pozueta notes, may be found in the figure of Ezra Buckley, the millionaire who funds the Tlön project: “The obscure man of (alleged) genius is this vulgar American, a classic nineteenth-century American amasser of wealth” (214, parentheses mine). Here, Borges draws a link between the two instances, between the imaginary world and the real. Just as how the *hrönir* unearthed in Tlön are created by the directives of a person in power, so too is the concept of Tlön created by an “amasser of wealth.” Furthermore, when Tlön begins to seep into reality, it is the *hrönir* that appear first – the objects shaped by prejudice and imagination that are capable of altering even the past. I refer again to the epigraph that precedes this section, which appears at the end of the story. The world, it is observed by the narrator, has always wanted to “fall under the sway of Tlön,” just as how it

has always subjected itself to systems of order, however fallacious, such as “dialectical materialism, anti-Semitism, Nazism” (*Fictions* 81).⁵⁵

At this point, it becomes clear that with the overt references to materialistic culture, industry, and methods of mass production, the story is making the point that knowledge has become subject to desire – and that by extension, the sciences has become a tool for capitalism. When Kuhn wrote “The Function of Dogma in Scientific Research” in 1961, he held optimism that for the scientist, “professional ideology” would still serve as a guiding principle for his “professional skills.”⁵⁶ But when Lyotard came upon the topic again in 1979, his prognosis was a lot more severe. For once a feedback loop has been established within the sciences between the funding agency and the scientist in need of funding, the original ideal of the scientist as “uncommitted searcher after truth” (Kuhn 347) is quickly buried beneath ever growing demands for results, proof, and data. Lyotard describes this insidious cycle as follows:

A technical apparatus requires an investment; but since it optimizes the efficiency of the task to which it is applied, it also optimizes the surplus-value derived from this improved performance... And the system can be sealed the following way: a portion of the sale is recycled into a research fund dedicated to further performance improvement. It is at this precise moment that science becomes a force of production, in other words, a moment in the circulation of capital. (45)

It is likely that during the first publication of “*Tlön, Uqbar, Orbis Tertius*” in 1940, the first *hrönir* had not yet begun their invasion into society. After Lyotard’s assessment of the postmodern condition, however, this is no longer quite certain.

⁵⁵ Pozueta uses this line, quite appropriately, to further her reading on Borges’s disturbing story of a Nazi war criminal’s psychology, “*Deutsches Requiem*.” Her point illustrates how easily mankind falls prey to ideology, as long as they convey a sense of order. In my argument, such an ideology would be capitalism.

⁵⁶ See Kuhn 368-69.

The Scientist's Phantom and Occam's Razor

In nearly every detective novel since the admirable stories of Conan Doyle there comes a time where the investigator has collected all the facts he needs for at least some phase of the problem. These facts often seem quite strange, incoherent, and wholly unrelated. The great detective, however, realizes that no further investigation is needed at the moment, and that only pure thinking will lead to a correlation of the facts collected.

Einstein and Infeld 4

In the first chapter of the 1938 book *The Evolution of Physics*, Einstein and Infeld liken the scientist's endeavor to that of the detective in a mystery novel.⁵⁷ It is ironic, then, that just four years later, and in the same genre of the detective story, the scientist-as-detective meets his match. For in "Death and the Compass," Borges creates the perfect *anti*-scientist, a predator feeding on logic and conjecture, in the character of Red Scharlach.

The question then arises: what sort of figure is the scientist that he possesses a natural predator? The scientist figure, as represented in the story by the detective Erik Lönnrot, is a "reasoning machine, an Auguste Dupin" (*Fictions* 147).⁵⁸ As impressive as that sounds, however, Borges makes the case that a man with acute reasoning faculties can be entrapped by those very

⁵⁷ Put more accurately, Einstein and Infeld initially liken the scientist to be the *reader* of a "perfect mystery story" – which in turn stands for nature (3). However, by page 5, scientist, reader, and investigator are already conflated: "It is our aim, in the following pages, to describe in broad outline that work of physicists which corresponds to the *pure thinking of the investigator*" (5, italics mine). In any case, it is clear that Einstein and Infeld relate the scientist to an investigator, or a detective, performing investigative work.

⁵⁸ Auguste Dupin is a fictional proto-detective created by Edgar Allan Poe, allegedly predating the term "detective" itself – according to Bandy, "Poe created an ancestor of an enormous family of sleuths, from Sherlock Holmes to Hercule Poirot" (509). This reference paints Lönnrot as the prime example of the detective, in line with Einstein and Infeld's "great detective" (4). The contrapuntal effect of "Death and the Compass" against Einstein and Infeld's imaginary detective is thus made even more pronounced.

same faculties, especially if his intuition leads him in the direction of attributing complexity to very simple problems. The plot (pun somewhat intended) of “Death and the Compass” may be summarized as follows. The detective Lönnrot is confronted with the first of what would become a series of murders. In the room of the first murder, which occurred on December 3, a slip of paper is found next to a typewriter bearing the following words: “*The first letter of the Name has been written*” (*Fictions* 149). Subsequent crimes follow the same pattern: the next murder happens on January 3, with the phrase “*The second letter of the Name has been written*”; the third, an abduction, happens on February 3, again with the phrase “*The last letter of the Name has been written*” (150-51). Lönnrot, ever the reasoning machine, notes that the crimes occurred at points forming an equilateral triangular; moreover, dates on which they happened are also equidistant. By linking Jewish mysticism with the spatial-temporal pattern he uncovered, Lönnrot conjectures that a fourth murder, representing the “secret” fourth letter of the supposed name of God, would soon happen at the Villa Triste-le-Roy. The detective heads towards the appointed place, where he meets his nemesis Red Scharlach. It is revealed at this point that the series of crimes had all been part of an elaborate ploy conceived by Scharlach designed specifically to prey on Lönnrot’s criminological and mystical inclinations. Lönnrot comments, drily, that Scharlach’s labyrinth is too elaborate by “three lines too many” when a single, endlessly divisible line would suffice to entrap him; Scharlach, agreeing, shoots him.

It is important to note exactly the kind of character Lönnrot is; he is not quite a scientist, but rather a caricature of one. Borges is not depicting the scientist or the investigator as *necessarily* a two-dimensional character obsessed with theory and abstract mysteries at the expense of what lies plainly before him. He merely suggests that any investigator, be it a scientist or a criminologist, has the potential to mistake the entrenched dogmas of his profession for the

truth. To guide the readers towards this realization, he describes all of Lönnrot's thoughts, habits, and predispositions with a kind of wry, ironic humor. We see that mostly in the exchanges between Lönnrot and the police commissioner Treviranus, who also forms another counterpoint to the detective – while Lönnrot is preoccupied with abstract puzzles and conspiracies, Treviranus is the everyman, the policeman who only wishes to get the job done in the most direct way. At the scene of the first murder, Treviranus makes the following conjecture to Lönnrot that the victim had been confused with the Tetrarch of Galilee:

“We all know that the Tetrarch of Galilee owns the finest sapphires in the world.

Somebody intending to steal the sapphires broke in here by mistake. Yarmolinsky (the victim) woke up, the burglar had to kill him. – What do you think?” (*Fictions* 148, parentheses mine)

To which Lönnrot replies:

“Possible, but uninteresting... You will reply that reality has not the slightest obligation to be interesting. I will reply in turn that reality may get along without that obligation, *but hypotheses may not.*” (148, italics mine)

We see a man woefully dedicated to his job: Lönnrot is, plainly speaking, putting hypothesis before fact – he is, in fact, shown to be *incapable* of doing otherwise. The detective's tendency to overcomplicate matters is further emphasized as he begins to delve into Jewish mysticism to explain the mysterious words left behind at the crime scene referring, ostensibly, to the name of God: “(A journalist wanted) to talk about the murder; Lönnrot preferred to talk about the many names of God. The journalist filled three columns with the story that the famed detective Erik Lönnrot had taken up the study of the names of God in order to discover the name of the murderer” (*Fictions* 149). Eventually, after the third crime has been committed, Lönnrot notes

that “[t]he three locations” of the crimes “were indeed equidistant. Symmetry in time (December 3, January 3, February 3); symmetry in space, as well... Lönnrot sensed, abruptly, that he was on the brink of solving the riddle... He smiled, spoke the word Tetragrammaton (a word he had recently acquired), and telephoned the commissioner” (152, parentheses original).⁵⁹

Needless to say, Lönnrot predicts the commission of a fourth crime, at a fourth location, at a fourth time; thus, he walks to the Villa Triste-le-Roy into Scharlach’s trap, and to his death. Scharlach interests us not because of his motivation, which consists of nothing but the desire for petty revenge, but for his methodology in ensnaring the “famed detective” Lönnrot. Drawing upon the paradigms of criminology to which Lönnrot so ardently adheres, Scharlach crafts a narrative based on Jewish mysticism, which the detective readily laps up: *that the crimes correspond necessarily* to the four letters of “YHVVH,” the name of God. In fact, in his final exposition to Lönnrot, Scharlach claims that *only* Lönnrot, and no one else, would be able to arrive at this particular conjecture:

The last letter of the Name has been written... That sentence revealed that this was a series of *three* crimes. At least that was how the man in the street interpreted it – but I had repeatedly dropped clues so that *you*, the *reasoning* Erik Lönnrot, would realize that there were actually *four*. (*Fictions* 156, italics original)

Had Lönnrot not been bound by his faculties of deduction, he would have, like any “man in the street,” seen it as a series of three crimes based on the word “*last*.” Were he anything less than a great detective, he would have managed to avoid death. Lönnrot, evidently admitting defeat, suggests to Scharlach that his labyrinth could have been more elegant: “There are three lines too

⁵⁹ Lönnrot’s clichéd behavior at this point draws an uncanny parallel with Einstein and Infeld’s imagination of the fictional detective just as he solves the mystery: “So he plays his violin, or lounges in his armchair enjoying a pipe, when suddenly, by Jove, he has it! Not only does he have an explanation of the clues at hand, but he knows that certain other events must have happened. Since he now knows exactly where to look for it, he may go out, if he likes, to collect further information for his theory” (4).

many in your labyrinth... I know of a Greek labyrinth that is but one straight line. So many philosophers have been lost upon that line that a mere detective might be pardoned if he became lost as well” (156).

What Lönnrot is invoking here is “Occam’s razor,” a principle of the scientific method, “formulated during the Middle Ages, (which) states, in one of its versions, that ‘what can be explained with fewer assumptions is done in vain with more’ ... according to Ockham’s razor, the best theory is the one that explains in the simplest way all the data that support it” (Rodríguez-Fernández 121). But it is ironic that Lönnrot should be the one who invokes it. After all he is the one who compounds his own conjectures with ever more extraneous details, dictated not by the facts of the crime at hand, but from his own professional habits. Even as he realizes his mistake, his conjectural inclinations still manage to kick in at this juncture – he suggests, rather unnecessarily, to Scharlach the structure of the perfect labyrinth: “When you hunt me down in another avatar of our lives, Scharlach, I suggest that you fake (or commit) one crime at A, a second crime at B, eight kilometers from A, then a third crime at C, four kilometers from A and B and halfway between them. Then wait for me at D, two kilometers from A and C, once again halfway between them. Kill me at D, as you are about to kill me at Triste-le-Roy” (*Fictions* 156).

The irony that Lönnrot *still strays* from the elegant simplicity propounded by Occam’s razor while he is citing it implies that even as he recognizes the value of the principle, his behaviors are ingrained. Lönnrot does not create his conjectures for the sake of being clever; he creates them because he genuinely holds the belief that “reality may get along within that obligation (to be interesting), but hypotheses may not” (148). The paradigms that he dogmatically adheres to are the clichés of the detective story, which renders his character a

parody of the kind of investigator Einstein and Infeld cite. But before we jump to the conclusion that Lönnrot is a flat-out critique of the scientist figure, we ought to remember that prior to his defeat at the hands of Scharlach, he remained “the famed detective Erik Lönnrot,” and that he once successfully arrested Scharlach’s brother and “saw that he was sent to prison” (149, 154). Driven by his adherence to dogma, Lönnrot has had a largely successful career, which is quite in line with Kuhn’s observation that the classic scientist does “at last succeed in producing within the paradigm a solution to even the most stubborn problems” (363). The problem, as Kuhn explains using his concept of the “paradigm shift,” only arises when the investigator is confronted by the most devious and labyrinthine problems – against which the scientist’s adherence to the old paradigm, formerly his greatest asset, becomes his greatest liability. This is what happens to Lönnrot in his battle of wits against Scharlach. Such a scenario then necessitates a paradigm shift, which we have seen already in quantum physics and chaos theory, where the entirety of the old paradigm has been all but discarded and reworked from the ground up.

Scharlach, then, represents the classic scientist’s natural enemy: a kind of problem so insidious that it seemingly provides false clues that lead the scientist to think he has solved the problem, when in fact the heart of it remains out of reach. These kinds of problems often provide challenges to existing instruments and practices of research, but are unfortunately also the ones that provide the clearest glimpse into reality and its inner workings. And if we were to recall the symbolism of the *hrönir* in “Tlön, Uqbar, Orbis Tertius” – which are manifestations of human bias and desire – much of what our current science might be uncovering could be products of paradigms that may one day be proven to be erroneous. The thought itself is chilling: how much of what we think we know are results of false clues – like the traps of Red Scharlach – born either of a deceptive reality or an inadequate *language* for describing reality? Borges, like most

philosophers of science that predate or succeed him, does not provide a clear answer to this problem. But he at least outlines through his stories that the very foundations of knowledge may be shakier than we think, and that part of the endeavor of science should be to identify its own fallacies, its own phantoms.

Conclusion: Reality on Two Scales

I have attempted to trace, across this thesis, just one of the many possible thematic trajectories one might find across Borges's oeuvre: that of science and its mechanisms. For the most part, bearing in mind that what at first appears unnatural to the reader is also an unmistakable constituent of everyday reality, unnatural realism seems reasonable as an umbrella term to describe the narrative mechanics of many Borges stories, especially the ones collected in the 1944 *Fictions*, which includes works from both *The Garden of Forking Paths* and *The Aleph*. Borges's technique when dealing with the very broad topic of reality is important, especially when it comes to presenting for the reader a view of how reality works. This is acknowledged by Shaw in his own conclusion, and represents much of his critical effort: "the fictional 'wrapping' of Borges' themes is really inseparable from the themes themselves and has to be examined in relation to them" (177). Just like the most iconic thought experiments, his stories substitute difficult equations for recognizable symbols and interpretable interrelationships between its many intricate working parts. Moreover, they provide an affective connection to the reader through the use of characters and their experiences.

One of the questions that need to be addressed more conclusively at this point is: how are Borges's works proper thought experiments, and why does he choose to create fiction that fits such a rubric? The answer to the first part is relatively direct: they describe and enact properties of reality – their interconnected and causal relationships – that would be difficult to enact in real life. We cannot quite *be* in all the futures made possible by our decisions, but we can *think* about them as if they were real. The answer to the second part has to be more nuanced. In terms of personal philosophy, Borges was particularly concerned with *vision*: not only with ways of

conceptualizing the world, but also somehow perceiving the world in an absence of sight. When an idea causes Borges distress – time and infinity are just two of such instances – he is sure to write an essay or deliver a lecture about it. When he was losing his vision in the later stages of his life, he gave a lecture simply titled “Blindness” – in it, he said, “I made a decision. I said to myself: since I have lost the beloved world of appearances, I must create something else” (*Non-Fictions* 477). This was spoken by an old Borges, a Borges who was no doubt referring only to the loss of access to the visual realm. But it may be argued that even in the early days of writing the stories comprising *The Garden of Forking Paths* and *Artifices*, he was also concerned that vision alone was not sufficient in perceiving the world. In some sense, writers, philosophers, and scientists were actually fumbling about in the dark trying to chance upon some unambiguous means – linguistic, formulaic, or otherwise – of describing reality. And at each turn, when the investigator of reality thinks that he has grasped at last the slippery object of his research, a full apprehension of nature continues to elude him.

The scientific philosopher Bernard d’Espagnat, who came up with the term “veiled reality,” recalls that Feynman once tried to explain the mysterious phenomena of antiparticles, which he considered “to be particles propagating towards the past” (214).⁶⁰ According to d’Espagnat, “Feynman resorted to quite an evocative analogy, that of a plane flying low following some road. At some time the pilot sees two other roads appearing within his field of vision. And some time later he sees that one of them meets the one he has been following and that both of them simultaneously disappear. He then realizes that there is really but one road and that what he flew over was but a large zigzag in the latter” (215). The same problem about vision occurs in Feynman’s analogy. In the absence of a sufficiently broad view of reality, certain

⁶⁰ Not much can be said about this phenomenon here – it belongs strictly in the realm of deep physics which even Borges’s imagination did not access. The important thing is how Feynman chooses to describe the implications of this concept.

elements of nature can be misinterpreted. Since we are but finite beings situated in space and time, it seems that, for now, at least, we have to make do with such a myopic scope.

What Borges sought to do was to preserve this labyrinthine nature of reality on two scales. On the first, the microscopic: the tiny printing in the books of the Library, the individual rolls of the dice that governs the Lottery in Babylon. On the second, the macroscopic: the whole order of the Library, the vast shifts across the Lottery, the materiality of all possible realities in Ts'ui Pen's novel. Parker's comparison of Borges with the work of M. C. Escher is apt – like in Escher's paintings, reality appears to be functioning properly at certain scales without a hitch; at other scales, reality appears to be wrong or paradoxical.⁶¹ Instead of having us look at one scale at the expense of the other, Borges has us look at both simultaneously and holistically – for the reader to take in reality *in toto*. This is the kind of vision one only gets in fiction, in thought experiments, or in art, but not in experienced reality, no matter how sensitive the instruments of measurement or perception. For while there is no circumventing our *situated*-ness in space and time, Borges's fiction allows us to step out of the box at least partially.

At the end of every survey of Borges, it appears almost customary to repeat Shaw's phrase, or some paraphrase thereof: "It is not possible to produce a 'grammar' of Borges' narratology. In the last resort we cannot get beyond Borges' own comment: '... creo que cada cuento impone su técnica' (I think every tale imposes its own technique [sic])" (180, parentheses are Shaw's own translation). Perhaps in trying to chase down this particular strand of thought I have become something of a Lönnrot, making the facts fit some arcane, imagined structure. But hopefully I have also, in such an attempt, become a bit of the Librarian in provided a semblance of an order, "the Order," however tenuous and however distant.

⁶¹ See Parker 13-14.

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