NARRATIVE FORM AND CHAOS THEORY IN STERNE, PROUST, WOOLF, AND FAULKNER

Jo Alyson Parker

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To Tom

Preface

In Tom Stoppard's witty and elegant play *Arcadia*, the nineteenth-century math prodigy Thomasina discovers the disorderly order of deterministic chaos that practitioners of chaos theory investigate today. She lacks, however, the mathematical language to articulate her findings, and, perhaps more important, she lacks the tool—the superfast computer—that would do the innumerable mathematical iterations necessary to display them. Thomasina burns to death on the night before her seventeenth birthday, and Septimus, her tutor and would-be lover, ends up as the lunatic Hermit of Sidley Park, performing those endless iterations in a tribute to his lost love. Thus, in Stoppard's excursion into the realm of might-have-been, Thomasina's possibly paradigm-shifting discovery is lost, relegated to a few disregarded notes in a schoolgirl's copybook and the seemingly meaningless calculations of a madman. As Valentine, the modern-day biologist who validates Thomasina's discovery, explains, "You can't open a door till there's a house."[1] Stoppard's play thus dynamically demonstrates that, for our ideas to get a hearing, a felicitous convergence of events must occur.

My project owes its genesis to such a felicitous convergence. In the nearly two hundred years since the fictional Thomasina and Septimus danced their first and final waltz, the "house" was built, and the "door" could be opened onto the vista of deterministic chaos. Because of computer technology, dynamicists can now perform the iterations that enable them to discern such chaos. Granted, such iterations can be done without the aid of the computer, but the process would be so time-consuming as to make it unfeasible—the work of a mad hermit.[2] Computer technology enables simulation and, consequently, allows dynamicists to apprehend and articulate the indeterminate determinism common to certain chaotic dynamical systems.

At the same time that the "new science" of chaos was generating a buzz, an interest in establishing connections between literature and science pervaded the academy.[3] The Society for Literature and Science (SLS—now the Society for Literature, Science, and the Arts) was founded in 1985, and it has grown rapidly since then. Its annual meeting and journal *Configurations* testify to the significance, applicability, and popularity of making connections between the humanities and the sciences, including applications of chaos theory to literary studies. The SLS annual meeting, in fact, provided the forum for my early work in this area, and the panel presentations and subsequent discussions supplied a fertile ground for helping me develop my ideas.

The interest in literary applications of chaos theory has gone beyond what might appear to be the specialized focus of SLS members. Annual meetings of such organizations as the Modern Language Association, the Society for the Study of Narrative Literature, and the American Society for Eighteenth-Century Studies have offered sessions that deal with the implications of chaos theory for literary studies. The 1995 meeting of the interdisciplinary International Society for the Study of Time was devoted to the subject of deterministic chaos, including its applications for literature. The Society for Chaos Theory in Psychology and Life Sciences features literary topics at its annual conference, further testimony to the interdisciplinary attraction of chaos theory. Major literary journals, including *New Literary Theory*, *PMLA*, and *Poetics Today*, feature essays on the subject, and significant full-length studies have explored literary applications of chaos theory.[4] In the approximately twenty years since chaos theory seized the public imagination, it has demonstrated real staying power, not only in the sciences but also in cultural studies.

In the 1990s, when I began teaching a seminar course in narrative form, I found myself applying the insights yielded by chaos theory to my readings of certain paradigmatic narratives. Each time that I taught the course, I benefited from the insights of a group of committed and lively students. Together, we focused on a variety of texts that foregrounded their own narrative dynamics. Chaos theory regularly provided a means of understanding these dynamics.

Out of this Zeitgeist, the following text has emerged. Drawing on contemporary theories of dynamical systems and of narrative, it melds theory and practice. It thus features two parts: (1) a detailed theoretical introduction and (2) readings of particular texts whose structure mimics that of chaotic systems. Overall, parts one and two function together as a feedback loop in that chaos theory sheds new light on the narratives and the texts, in turn, make concrete the abstractions of the theory.

The four texts that I explore are all are novels from the modern age, so I use the term narrative deliberately. To focus on the novel as such invites a discussion of its generic features and the general social, cultural, and historical circumstances out of which it arose during the eighteenth century. I choose to emphasize a dynamical structure rather than a genre and to demonstrate how each of the four texts presents a particular chaotic response to a particular narrative problem. Because the novel genre is the most important form of sustained narrative, it offers rich veins for exploration.

I should make clear that I do not put forward a history or progress of chaotic narrative. I do, however, arrange the texts chronologically, moving from the mid-eighteenth to the mid-twentieth century, and I suggest how earlier writers may have influenced later ones. As I argue, the four texts serve as exemplary chaotic narratives, and examining them through the lens of chaos theory illuminates their complex dynamics.

Acknowledgments

Many people have helped me bring this book to fruition. My initial interest in narrative form was sparked by a long-ago course taught by Alexander Gelley, whose insights helped me begin working toward my own theory of narrative. Owen Gilman encouraged me to return to earlier work on *Absalom, Absalom!*, and the result was some of my first work in chaos theory. Michael Wutz and Joseph Tabbi provided me with my first opportunity to publish such work. Theodore E. D. Braun's panel on "eighteenth-century chaos" at the meeting of the American Society for Eighteenth-Century Studies prompted me to tackle *Tristram Shandy*, and he and John McCarthy spurred me to examine the novel further for the collection *Disrupted Patterns*. Alexander Argyros, Maria Assad, J. T. Fraser, and Paul Harris helped enlarge my thinking on narrative form and chaos theory.

Early versions of the book chapters profited from the comments of Saint Joseph's University English faculty who participated in the summer writing group, including Thomas Brennan, S. J., Melissa Goldthwaite, Ann Green, Richard Haslam, Nimisha Ladva, April Lindner, and Deborah Scott. Richard Fusco read the entire manuscript through at least twice, and his editorial comments have proven invaluable. I am grateful to Eileen Cohen, Elizabeth Doherty, Jane Fraser, Virginia Johnson, Francis Morris, Audra Parker, Kevin Parker, and Katherine Sibley for the support and encouragement that they provided during the writing process. Loretta Giello's administrative abilities consistently have helped make onerous tasks more bearable. I would also like to thank the students of my "Seminar in Narrative Form" for their provocative questions and perceptive comments.

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Finally, my greatest thanks go to my family. At the age of four, my daughter Lizzy defined the exemplary narrative plot: "Once upon a time. The middle. The end." Now in her teens, she fulfills the potential of this early wisdom in her increasingly more sophisticated analyses of narrative, which help me refine my own thinking. She has been patient and encouraging as I have worked through the various drafts of the manuscript. I am grateful to my husband, Thomas Weissert, for support both personal and professional. Our conversations about narrative form and chaos theory began many years ago, and they inspired me to begin writing. Tom's rigorous reading of the manuscript has helped me, a nonscientist, refine my thinking. Any scientific gaffes rest with me alone. I thank him also for generating the figures that appear in chapters 1 and 3.

Parts of chapter 2 were published as "Spiraling down 'the Gutter of Time': *Tristram Shandy* and the Strange Attractor of Death" in *Weber Studies* 14 (1997): 102–14 and as "'The Clockmakers Outcry': *Tristram Shandy* and the Complexification of Time" in *Disrupted Patterns: On Chaos and Order in the Enlightenment*, edited by Theodore E. D. Braun and John McCarthy (Amsterdam-Atlanta, GA: Rodopi, 2000.): 147–60. An early version of chapter 5 was published as "Strange Attractors in *Absalom, Absalom!*" in *Reading Matters: Narrative in the New Media Ecology*, edited by Joseph Tabbi and Michael Wutz (New York: Cornell University Press, 1997) 99–118. I thank the publishers for permission to draw upon this material.

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CHAPTER 1

Chaos Theory and the Dynamics of Narrative

This is not science. This is story-telling.

—Tom Stoppard, *Arcadia*

Science looked a lot like literary criticism, from across the room.

—Richard Powers, *Galatea 2.2*

But attractors are themselves models. They are metaphors for processes.

—J. T. Fraser, "From Chaos to Conflict"

What you are about to read is not science but storytelling, a narrative about narrative. In the following pages, I examine how science may indeed look "a lot like literary criticism." Specifically, I look at how contemporary ways of modeling turbulent dynamical systems in the physical world look like models of a certain kind of literary narrative structure, and I consider what the implications of that analogy are.

During the early 1980s, with the aid of computer-generated simulations, scientists discovered or, more accurately, identified deterministic chaos, a circumstance that "has created a new paradigm in scientific modeling," according to four of the founders of chaos theory.[1] Chaos theory enables us to see the physical world in new ways and to look anew at texts that I call "chaotic." By viewing such texts through a chaos-theory lens, we can link narrative structure with narrative content and link the formalism of traditional narratology with the reader's production of narrative meaning.

"Chaos theory" is a nonspecialist, catchall term that we use to cover the study of chaotic behaviors in a variety of disciplines—biology, chemistry, economics, and so forth. I focus on chaos theory as practiced within physics, wherein it occupies a particular subdiscipline called "dynamical systems theory."[2] Although "dynamical systems theory" more accurately designates the scientific modeling I hereafter describe, I nevertheless use "chaos theory" to acknowledge the phrase's greater cultural resonance.[3]

Chaos theory has changed the way in which we conceptualize so-called chaotic structures in the natural world. Once regarded as "poor in order," chaos has come to be seen as "rich in information," according to N. Katherine Hayles, one of the first literary scholars to draw on chaos theory.[4] Once seen as aberrant, the nonlinear and the random are now understood as prevalent, and physical behaviors once disregarded and dismissed are now considered legitimate areas of inquiry. The most far-reaching insights that chaos theory offers us are that patterns of order emerge spontaneously out of random behavior, that deterministic systems can generate random behavior when small uncertainties are amplified as the system develops through time, and that time itself can operate differently at local levels. Models of chaotic systems demonstrate the entanglement of system and systematizer in generating meaning, a feedback loop thus running between the subjective observer and the object under observation.

By looking through a chaos-theory lens, we can gain new insights into narratives whose structures display chaotic qualities. Such a reading enables us to apprehend how their form is their meaning, which emerges from the particular social, cultural, and historical circumstances, and how their meaning is dynamical, entangling the reader in the interpretive process. Through the perspective afforded us by chaos theory, we can discern the disorderly order—the complex yet simple elegance—of these narratives.

The Ordered Universe of Classical Physics

In *Tristram Shandy*, Tristram's Uncle Toby, engaging in a hobby-horsical attempt to recreate the Battle of Namur, calculates the trajectories of the cannonballs that were fired. If he knows the position and velocity of the cannonballs at a certain time, he should be able to predict their future state. The episode thus demonstrates the way in which the deterministic, time-symmetric assumptions of Newtonian or classical physics enable one to solve a particular sort of physical problem and thus attain an apparent mastery of the physical world.

From the time Uncle Toby appeared in fiction until the late twentieth century, what Julian Hunt called the "Newtonian-Laplacian clockwork view of the universe" held sway in the sciences.[5] Stephen Kellert aptly characterizes these beliefs as "the clockwork hegemony."[6] According to the Newtonian paradigm, we live in a universe whose workings function as regularly and predictably as those of a clock (an infallible, perpetual clock), its hands sweeping across its face in an exactly repeatable motion and at exactly the same rate of speed. Classical physics is predicated on the related notions of stability, repeatability, predictability, causality, absolute time, and observer objectivity.

Classical physics focuses on a class of physical systems whose entire behavior can be exactly calculated with a set of equations. Peter Covenay and Roger Highfield explain their pre dictive power: "Newton's equations of motion are such that, no matter what the positions and velocities at an initial time of observation—the *initial conditions*—the behavior of the system is determined for all future and past times" (emphasis in the original).[7] For instance, a frictionless pendulum always obtains an exactly repeating cycle, even when we start it swinging in a different way each time. Its behavior is predictable. James Crutchfield et al. claim, "The great power of science lies in the ability to relate cause and effect. On the basis of the laws of gravitation, for example, eclipses can be predicted thousands of years in advance."[8] Clearly, classical physics explains and predicts with accuracy many physical systems.

However, classical physics also ignores those systems that cannot be accurately predicted. Stephen Kellert comments upon this "prejudice": "Education in the natural sciences created the impression that linear and solvable systems were the only ones (or at least the only important ones)."[9] The case of Edward Lorenz is exemplary. In 1963, he published what later came to be regarded as groundbreaking chaos-theory articles in meteorology journals, which physicists ignored.[10] The classical physicist examines the dynamics of a pendulum or the solar system but not those of the weather or a dripping faucet or a water wheel.

The essence of classical physics resides in the reflexivity of predictability and determinism: if a system's behavior is predictable, the system is deterministic, and if a system is deterministic, its behavior is predictable. Because of this exclusive focus on predictable systems, classical physics leads to an inherently deterministic view of the universe. Indeed, in the early nineteenth century, Pierre Simon de Laplace envisioned an imaginary entity—a "demon"—who would be "capable at any given instant of observing the position and velocity of each mass that forms part of the universe and inferring its evolution, both toward the past and toward the future."[11] This demon could retrodict all past states of the universe and predict all future ones; it was "an intelligence that recognizes all forces of nature and the elements that compose it," for whom "nothing would be uncertain."[12] Until the advent of chaos theory, science worked on the assumption that such a "demonic" intelligence could be achieved, enabling, as Julian Hunt suggests, the ultimate control of nature: "One might describe the mid-twentieth century view as the confident belief that the natural world is largely predictable and rational, so that with the assistance of information theory, computing power, and system control . . . it would be possible even for the natural world to be controlled by human intervention."[13] According to the classical paradigm, with the right tools, we could eventually fathom all the workings of the universe—a situation that, as Ivar Ekeland wryly observes, "is enough to stifle with boredom several generations of astronomers."[14]

If we assume that the workings of the universe are completely predictable, running like a well-regulated clock, certain assumptions about time pertain. In order to predict future events and retrodict past ones accurately, we must assume that a fixed rate of time pertains. The Newtonian view of time is, after all, absolutist, predicated on notions of linearity and periodicity. In *Principia Mathematica*, Newton makes his well-known distinction between absolute time and relative time:

> Absolute, true, and mathematical time, of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration: relative, apparent, and common time, is some sensible and external (whether accurate or unequable) measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year.[15]

According to this absolutist view of time, just as we see events as occurring in a definite place, we see them also as occurring at a definite time, as Ilya Prigogine and Isabelle Stengers explain, "In classical mechanics time was a number characterizing the position of a point on its trajectory."[16] In essence, we assume that events can be fixed upon a uniform time line.

Interestingly, in the passage from the *Principia*, Newton discriminates between an idealized time independent of any external factors and a timing of time, which involves using an external means of measuring it. Michel Serres observes, however, "*People usually confuse time and the measurement of time,* which is a metrical reading on a straight line" (emphasis in the original).[17] Such confusion stems from an implicit connection between the mechanical clock and the Newtonian notion of absolute time as a laminar flow, unchanging in its rate. According to G. J. Whitrow, the mechanical clock may actually have given rise to the notion of uniform time:

> [T]he invention of an accurate mechanical clock had a tremendous influence on the concept of time itself. For unlike the clocks that preceded it, which tended to be irregular in their operation, the improved mechanical clock when properly regulated could tick away uniformly and continually for years on end, and so must have greatly strengthened belief in the homogeneity and continuity of time. The mechanical clock was therefore not only the prototype instrument for the mechanical conception of the universe but for the modern idea of time.[18]

The clock becomes, in Prigogine and Stengers's terms, "the very symbol of world order."[19] God is regarded as the divine watchmaker who wound up the great machine of the universe and left it to tick away at a regular, predictable rate.

The clockwork view of the universe depends on the notion of observer objectivity—that is, the notion that the observer merely records but does not shape natural phenomena. Evelyn Fox Keller points out the connection that is made between observer objectivity and scientific progress: "It is often argued that the very success of modern science and technology rests on a new methodology that protects its inquiries from the idiosyncratic sway of human motivation."[20] An integral premise of the scientific method is that scientists, irrespective of their particular situation, will obtain the same results when performing the same experiment—the agent who performs the action thus nonessential to the results. This premise of scientific objectivity sets up a separation between nature and humanity, as Priogogine and Stengers describe: "Man is emphatically not part of the nature he objectively describes; he dominates it from the outside."[21]