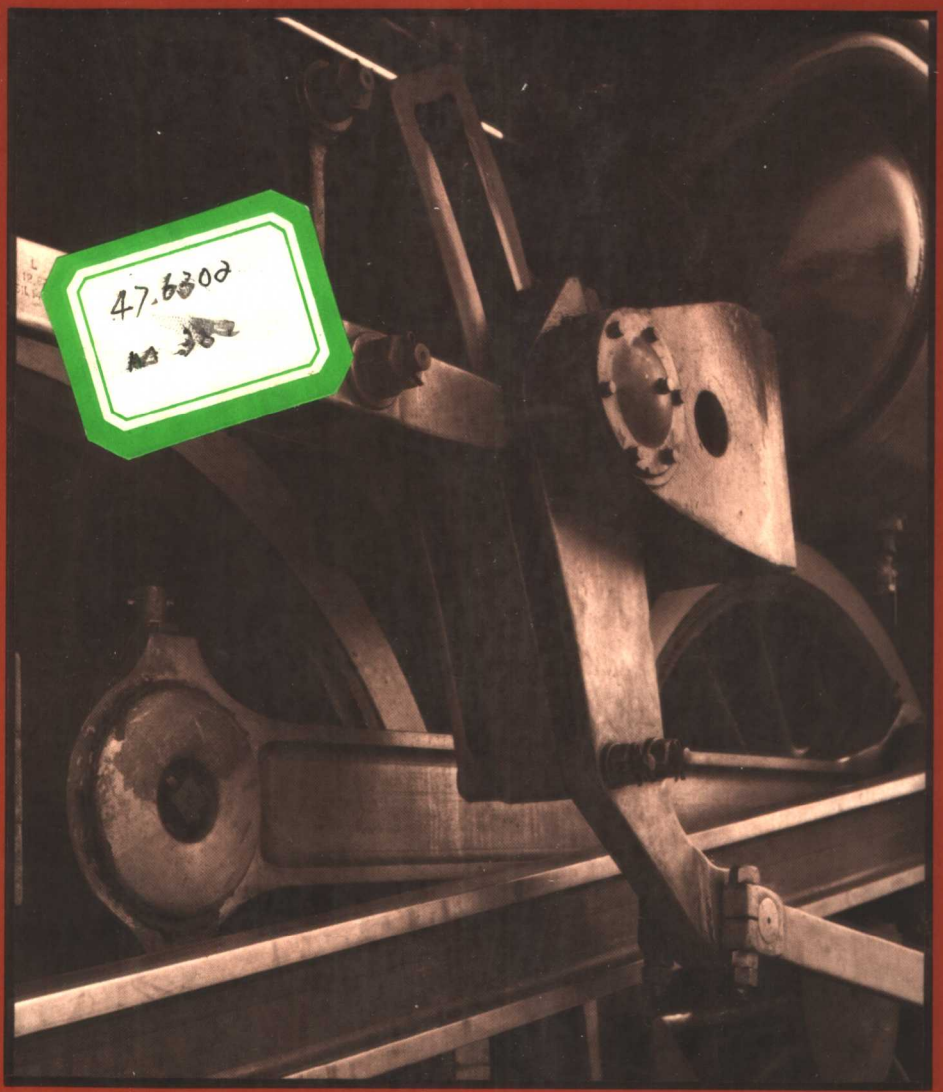
*Ronald E. Martin*

# AMERICAN LITERATURE AND THE UNIVERSE OF FORCE



*Ronald E. Martin*

# AMERICAN LITERATURE AND THE UNIVERSE OF FORCE

. . . This leads us to undertake an account of the idea of Force in general. This is the great conception which, developed in the early part of the seventeenth century from the rude idea of a cause, and constantly improved upon since, has shown us how to explain all the changes of motion which bodies experience, and how to think about all physical phenomena; which has given birth to modern science, and changed the face of the globe; and which, aside from its more special uses, has played a principal part in directing the course of modern thought, and in furthering modern social development. It is, therefore, worth some pains to comprehend it.

C. S. Peirce, "How to Make Our Ideas Clear," *Popular Science Monthly*, 1878

All things are an exchange for fire, and fire for all things, even as wares for gold, and gold for wares.

Heraclitus

Duke University Press Durham, North Carolina 1981

Printed in the United States of America
on acid-free paper.

Second printing, 1983

**Library of Congress Cataloging in Publication Data**

Martin, Ronald E., 1933–
American literature and the universe of force.

Bibliography: p.
Includes index.
1. American literature—History and criticism.
2. Naturalism in literature. 3. Literature and
science. 4. Philosophy in literature. I. Title.
PS169.N38M3 810'.9'12 81-7806
ISBN 0-8223-0451-1 (cloth) AACR2
ISBN 0-8223-0579-8 (paper)

# ACKNOWLEDGMENTS

THIS STUDY has been nearly thirteen years in the making, and I have received valuable help, support and encouragement at every stage of the work. I would like to acknowledge, first of all, the University of Delaware, which contributed to this book in many ways, giving me two sabbatical leaves, two summer grants, a typing grant, some student assistance and a little released time, as well as the trust and the leeway I needed to work on a major project for all that time without requiring me to demonstrate my scholarly worth in frequent small projects. The four chairmen my department has had over these years, Paul Cundiff, Edward Rosenberry, Charles Bohner, and Zack Bowen, have been instrumental in gaining and channeling the University's support for this project. Edward Lurie has been both supportive, as director of the University's Center for Science and Culture, and informative, as a historian of American science. I would also like to acknowledge the support of the American Council of Learned Societies which, by awarding me a Grant-in-Aid in 1967, gave me invaluable encouragement.

I carried out my research at the University of Delaware Morris Library, the Library of Congress, the New York Public Library, the Massachusetts Historical Society, and the Cambridge University Library, and I appreciate both the accessibility of these collections and the helpfulness of the librarians. My student research assistants in the early stages of the project, Gordon Henderson, Gary Mullinax, and Charlotte Godfrey, deserve recognition for their careful and useful work. The final preparation of the manuscript for submission was done extraordinarily well by Rita Beasley, for which I am extremely grateful. Donald Pizer and Peter Shaw both offered very helpful suggestions about the completed manuscript. And finally and most of all, I thank my wife Barbara, whose intelligence, attentiveness and concern have infused and inspired this project at every stage, from the first long discussions of its largest issues to the copy-reading of its last comma; that sharing is a finer thing than any book can be.

*University of Delaware:*
*Department of English, and*
*Center for Science and Culture*

# INTRODUCTION

THE IDEA that reality was in essence a system of forces was widely popular and influential in America around the turn of the century. Its spread was a new movement in thought, originating in mid-nineteenth-century science and rapidly extending its manifestations, explicit and implicit, throughout American culture. The views associated with what I call "the universe of force" appeared not only in the usual media of scientific and philosophical discussion, but in newspapers and novels, in letters and diaries, in speeches, sermons, and boardroom exhortations. A whole generation of Americans was in fact reared on emerging scientism and the "Synthetic Philosophy" of Herbert Spencer. Americans as eminent and various as Andrew Carnegie, John Fiske, Jack London, and Henry Ward Beecher embraced this brave new synthesis, and those who did not were virtually put on the defensive by it. As John Dewey said in looking back on Spencer's influence in America, "He has so thoroughly imposed his idea that even non-Spencerians must talk in his terms and adjust their problems to his statements."[1]

The movement is gone now as such, the concept of a force-universe leaving only scattered residues in our language and literature, our sociology, and our popular physics, but it deeply infused turn-of-the-century American culture and literature, it played an important part in shaping our twentieth-century scientific culture, and it is unquestionably significant for its lessons in the history of our modes of thought. For all those reasons, the effort to understand the complex story of the universe of force is, to echo C. S. Peirce's words, clearly "worth some pains."

The following is a study, then, of the origins, transmission, and uses of this historically important concept in our culture. I examine the concept of a force-universe as it appears in science, philosophy, and imaginative literature, from its origination as a loosely defined but extraordinarily fruitful premise in the science of the 1840s, through its elaboration (even as it was becoming increasingly obsolete in science) by Spencer and like-minded metaphysicians into a rationalistically magnificent universal system, and ultimately in the heydey of its public acceptance, to its incorporation (even as metaphysics itself was dying) by Henry Adams, Frank Norris, Jack London, and Theodore Dreiser, variously and individualistically, into the fabric of literary works they hoped would stand as timeless. At every stage of transfer of the concept from one discipline to the next there was cultural lag, misunderstanding, and distortion

to the point of redefinition, but, strangely, there was often new discovery too. It is an intricate and revealing phase of our intellectual and artistic past, and I intend to give it careful and genuinely interdisciplinary scrutiny, not merely following a straightforward chain of influences through the history of thought, but studying each successive articulation of the universe of force in the context of its own time, culture, and discipline. Only in this way, I feel, can we approach the complex significances of the whole episode.

THE CONCEPT of force came to scientific prominence in the early and mid-nineteenth century, as the base concept in the "discovery" of one of modern science's most important theories, the law of the conservation of energy. This law was first formulated in the 1840s as the Law of the Conservation of Force, and, curiously, it was discovered virtually simultaneously by perhaps a dozen widely separated scientists, each taking a somewhat different route. They tended to think of force as inherent in or acting upon physical nature wherever motion or change occurred (and in this they were undoubtedly influenced by the term's varied and fertile vernacular tradition). Especially in conversion phenomena, where motion was converted into heat, for example, or chemical reaction into electricity, they believed that what they were observing was the transformation of an entity—force—from one form to another; and as they began to be able to quantify these correlations and see consistency in the rates of exchange, they felt confirmed in the intuition they had had from the beginning: that, as was the case with the already established theory of the conservation of matter, the total quantity of force in the universe was unchanging, that force could neither be created nor destroyed. It was an enormous inductive leap, but its payoff was enormous too, as the Law of the Conservation of Force provided the theoretical framework for a rush of scientific activity which yielded dramatic results, especially in the correlation of previously separate branches of science. Even biology and psychology were greatly stimulated by the inclusion of their phenomena in the overall picture of universal conservation. It was an exciting era of scientific discovery, and I argue that the very protean vagueness of the term *force* played a part in the formulation and amazingly productive application of the idea of universal conservation. Scientists generally soon refined their terminology, in the 1850s substituting the term *energy* for the somewhat more ambiguous *force*, and gradually coming to rely more on mathematical and less on verbalized articulation, coming to question the habit, as old as philosophy itself, of assuming the actual existence of such a metaphysical entity as "force." In twentieth-century science *force* has had little importance other than as a purely relational

concept in mechanics, but the effects on science, language, and culture of those heady days of the Law of the Conservation of Force were far-reaching and long-lasting.

The English philosopher Herbert Spencer came of age intellectually in this milieu of burgeoning science and the conservation of force and, personally disinclined toward religion, he experienced the rationalist's equivalent of an epiphany when he conceived a cosmic scheme based on a combination of what he called "the persistence of force" and an equally idiosyncratic concept of evolution (contemporaneous with Darwin's but independent of it). "Force" was the fundamental element of Spencer's universe, and he envisioned force's innate and peculiar pattern of evolution (and devolution) as the pattern of universal process, whether it be in the formation of the solar system, the industrialization of nineteenth-century Europe, or the development of artistic style. Spencer, an extremely dedicated man, produced dozens of volumes which taken together fulfill to a surprising extent his ambition of applying his vision of force evolution to every area of human knowledge. Seen retrospectively, his contribution seems in fact to have been to pick up the philosophical preconceptions of force-oriented science and elaborate them into a comprehensive model of the universe, although in his own mind he felt he was describing the real and absolute order of things knowable. It is ironic that he did it at a time when scientific thought had largely bypassed both his method and his basic concept of force. Although his works were obsolete in their "first principles" and unsophisticated method virtually from the moment of their publication, they are still impressive today in their scope and painstaking thoroughness, and it is not difficult to empathize with the vast number of his American contemporaries who, attuned to his partly metaphysical, partly scientific style of thought (and themselves perhaps less than wholly sophisticated in epistemological matters) saw in Spencer's "Synthetic Philosophy" a convincing description of the universe and its processes.

In late nineteenth-century America, then, universe-of-force ideas were promoted and endorsed by philosophers, scientists, ministers, journalists, and others, and, despite trenchant criticism by several of our best thinkers, widely adopted. The extent of the ideas' influence can be traced in the field of imaginative literature, and that literature can be better understood when viewed in the light of this connection, because although literary artists are often highly and subtly aware of the intellectual currents of their day, the special and specific demands of their craft often work counter to any such sweepingly general theory of reality, and the tension thus produced is not only revealing about the culture that spawned it, but is interesting—esthetically and intellectually—in itself. When Henry Adams, for example, attempts in *The Education of Henry Adams* to study his society and times using terminology, theories, and even

structural forms derived from the scientific and social force-lore of his times, or when Frank Norris launches a trilogy aimed at representing the impact of the colossal "force of the wheat" on farmers, speculators, and consumers, they are showing the influence of the universe of force, to be sure, but, more interestingly, they are struggling with these physics-born concepts in the full contexts of their creative imaginations, where the rationalistic truth or falsity, currency or obsolescence of individual concepts matter far less than the quality of the intuition, esthetic sense, and whole symbolic vision they are able to embody in particular works. It seems ironic that imaginative writers should have tried to build timelessly with conceptual materials that were fallible and obsolete; it is beyond irony that they succeeded.

Although the fact was not at all evident to its turn-of-the-century proponents, the universe of force is, of course, a purely conceptual universe. That it is indeed a metaphysical notion based on a specific theory of nineteenth-century physical science is worth a moment's consideration at the outset so that the broadest significance of the study can be ascertained. The concept of force is nonempirical; despite appearances, it is an arbitrary concept, possessing no special relationship to reality. The term *force* is essentially figurative in all its uses, and in its functions of explaining relationships underlying experience it carries along with it implications of mechanistic and inevitable causality. This is, of course, expressive of the mind-set of most of the science of its age—materialistic, deterministic, reductive, and absolute. As a whole approach to reality, a system that describes the universe in terms of forces differs from traditional metaphysical systems in that it is nonanthropomorphic and nontheological; its fundamental patterns come not from man's own qualities or ideals but from his conception of the laws of the behavior of physical objects. New in substance, in that it was rooted in science and scientific rationalism, yet old in approach, in that it was conceived and articulated in terms of metaphysical entities, laws, and absolutes, the universe of force is a peculiar sort of transitional landmark in Western thought.

A number of scientists of the 1840s previsioned force-metaphysics in highly optimistic terms: a universe so based would be both totally accessible to man's intellect and utterly beautiful in its rational intricacy. Spencer and the force-oriented philosophers showed the moral goodness of this rational intricacy and located in its processes humane ideas of ethical progress and (principally in American versions) the will of a benevolent and personal god. But it remained for imaginative writers—notably Henry Adams, Frank Norris, Jack London, and Theodore Dreiser—to sense and begin to articulate the human significance of the starkly mechanistic basis of this view. In their works we get the first clear intimations of how depressing, amoral, and absurd the universe

can appear to man in certain nontraditional, nonanthropomorphic conceptual frameworks; they give us our first strong taste of naturalistic alienation.

In addition, the universe-of-force viewpoint was of a piece with some of the Western world's most pernicious social practices and theories at the turn of the century. Force-thinking generally rationalized racism, class superiority, imperialism, the acquisition of wealth and power, and veneration of the "fittest." Explicitly a philosophy of inevitable and benevolent progress, of an evolutionary hierarchy in which some individuals or societies are by nature superior because of their higher organization or greater concentration of power, it meshed only too neatly with the rampant forms of Social Darwinism and helped to obscure from otherwise responsible men the obligation and even the possibility of social reform. Furthermore it tended to be socially deterministic, fatalistic; if life were structured and controlled by forces, what significance could individual or social responsibility possibly have? The universe-of-force conception justified a power-hungry, imperialistic society, and those thinkers and writers who attempted to stand against such a society's callousness, exploitation, and greed often found themselves at odds with their own concept of the very nature of physical reality.

These problem areas of determinism and social inequity seem to have bothered Spencer and the philosophers but little—in a metaphysical framework, in the balance with higher abstract good, social injustice and individual insignificance were temporary, lesser evils, relatively easily accommodated. For scientists too, the nature of their discipline tended to take them away from such conflicts. But for the imaginative writers, whose commitment was neither to usable science nor to metaphysical consistency, the anguish was less concealable. Their allegiance to a philosophical pattern was often at odds with their more immediate perceptions, emotions, and ideals, and their works, in directly involving their immediate human responses, clearly represent, and in some cases place in revealing perspective, these contemporary contradictions and tensions. The universe of force was for all thinkers a paradigm which in some ways liberated and in some ways limited thought; in the moral and social realms works of imaginative literature especially show this mixed effect, and at times even show an author's awareness of it.

One of the fascinating aspects of an interdisciplinary study such as this is the comparative view it can give of the ways in which various disciplines discover, use, and develop a concept. Science, philosophy, and literature use language in somewhat different ways: their explanations are somewhat differently constituted, and their metaphors have somewhat different functions. They also develop different criteria of evidence and "proof," and different means of deriving implications, subconcepts, or corollaries. In a way, force is force when

a scientist, a philosopher, and a literary artist discuss the subject with one another, and in a way it is not. They do to some extent understand one another, but one might be professionally concerned with the quantitative causal relationships between physical bodies, another might deduce a benevolent universal process, and the third deeply sense the circumstantial violation of an individual person's moral autonomy. Interestingly, the value of the concept employed within one disciplinary framework is not necessarily limited by its value in any other. As we shall see, an obsolete, discredited, and maybe even misunderstood concept of physics can indeed yield discovery in the field of literature. Disciplines interact awkwardly but fruitfully. These themes will claim some attention in the pages to follow, especially in the crucial regard of the humanistic employment of nonhumanistic knowledge.

IN STUDYING an intellectual movement that had its impulse deep in human nature and its origins distant in human history, that grew on two continents, flourished for almost a hundred years, and permeated virtually every area of human culture, an author must resign himself to severe and arbitrary exclusions or never see the end of his labor. The whole story of the concept of the universe of force in Western culture includes not only its backgrounds, development, and transmission, but the individual people who created it and found that it did or didn't suit them, the times and milieus in which they did their work, the intellectual disciplines through which they developed their insights, and the effects of their thought on their world. Given so broad a field, many of my exclusions had to follow from limitations of my own knowledge and capacity; for what was within my range or could conveniently be gotten there, selectivity followed from my sense of what was most significant in the developing structure of the idea of the universe of force.

In somewhat more specific terms, the inclusions and exclusions which my approach entails are as follows. The history of the development and transmission of the concept of the universe of force, being both fully accessible and absolutely necessary to the study—its backbone, in fact—has been treated thoroughly and centrally. Of the concept's many formulations and repudiations I have chosen those that seemed most representative and revealing. I have tried to reconstruct the historical universe of force here, relying on actual usages and direct influences and especially not yielding to the temptation to designate anything as "force" that was not so designated by the people of that day. Their usage of the term was indeed broad, but characteristically related to ideas of mechanical correlation, universal conservation, Spencerian evolution, and the like, and I have tried to let their usages and thought patterns

dictate my selectivity. Of course there were other kinds of deterministic, transcendental, and energy-oriented ideas in the air in the late nineteenth century, but I have largely foregone discussion of them in order to focus on the direct line of influence I am identifying.

I have not had the space to go very extensively into the lives of the people who created and contributed to the universe of force. The times and milieus of these people and their ideas are if anything even more difficult to be both economical and truthful about, but here I could often exclude a great deal and rely both on my readers' general cultural knowledge and on the already large number of books offering historical views of the period to fill in the background. On the subject of the particular disciplines through which the force-universe concepts were developed, I felt that I had to be explicitly didactic. Because our tendency is to simplify intellectual history and to imply that a particular idea is the same idea wherever it occurs, I felt it necessary to emphasize each discipline as a separately integrated context of meaning and method that both affects and is affected by the new idea.

In treating the effects of universe-of-force concepts in human experience, I have normally confined myself to experience in science, philosophy, and literature. The concepts had other interesting and far-reaching implications—in the social, political, and religious spheres, for instance. I allude to such implications occasionally, but I have generally (and perhaps arbitrarily) thought of them as beyond the bounds of my project. The heaviest emphasis in the book falls on the imaginative literature and the effects in it of the scientific and philosophic ideas; to me this is the most interesting and enlightening aspect of the subject.

I do not intend to discount the importance of the large body of valuable scholarly and critical opinion about the figures and works I discuss, but in the interest of getting on with a very long story I have not joined critical frays along the way nor comprehensively anticipated objections to my views. Similarly, I have not systematically acknowledged ideas relatable in some way or other to my own, except in the causes of making my points clear or discharging the obligations of direct intellectual indebtedness.

Briefly, such are the principles of selectivity by which I have tried to reduce the whole story of the universe of force to the point of manageability. I mean the book to offer new insight into America in transition. The concept of a force-universe was, I maintain, an important and influential factor in the increasingly secular, scientific American culture of the turn of the century. To shed light on this period by studying the multifarious constituents and effects of this concept is my basic aim, and beyond that, to use this particular historical context to better understand human mentality. Thus I mean to reveal a complex cultural situation, not just trace a linear development. For this pur-

pose I would like to have the study regarded as a kind of idea-novel, with the universe-of-force concept as a changeable protagonist—not very admirable or easy to identify with—followed through a number of inconclusive episodes which illustrate no single theme and teach no single lesson, unless it is the broadest and simplest one of all—that man can never know enough.

# CONTENTS

# AMERICAN LITERATURE AND THE UNIVERSE OF FORCE

# PROLOGUE: VERNACULAR *FORCE*

THE TERM *force* had a rich vernacular tradition before its articulation as a central concept of the science of mechanics. This vernacular tradition continued to support and affect the term as it was extended from mechanics into the burgeoning fields that later came to be called thermodynamics and energetics, and subsequently to support it as it was carried into all areas of science, indeed, by this route into all areas of systematic knowledge. Surveying the vast array of historical uses of *force*, the *Oxford English Dictionary* not only shows that its applications in physical science were preceded by three hundred or more years of popular use with a wide variety of meanings, but explicitly states that as a term in physics *force* was "used in various senses developed from the older popular uses."[1] Our preliminary concern, then, before we consider *force*'s amazing career in nineteenth-century thought, is with the popular usages that exerted so much influence over scientific conceptualization.

As early as the fourteenth century, judging from the *O.E.D.* listings, *force* had a varied and complex set of significations, ranging from nature's strength to man's moral fortitude. Deriving from the Latin *fortis* (strong), as early as 1300 it was used to designate, as an attribute of a living being, "physical strength, might, or vigour," and "as an attribute of physical action or movement: strength, impetus, violence, or intensity of effect." Examples the *O.E.D.* offers include, from c. 1400, *Ywaine and Gawain*, "With hir force sho hasted so fast that sho overtoke him at the last," and from Dampier's *Voyages* of 1697, "The Sea falls with such force on the shore." The power or might possessed by a ruler is another of *force*'s earliest significations, often specifically in reference to military power, an armed force. Another of its earliest meanings was strength or power as specifically exerted upon an object or a person, this use carrying connotations of necessity, constraint, coercion, and even of violence. Thus, Milton's use in *Paradise Lost* (1667), "To work in close design, by fraud or guile, What force effected not," or Defoe's in *The True-Born Englishman* (1701), "The Bad with Force they eagerly subdue." Individuals could also have the subjective sense of being under the constraint or compulsion of a nonmaterial force, as in Wolsey's 1690 statement (in the *London Gazette*), "It was a very unfortunate Force, which the soldiers . . . put upon me, to burn the Town." And in another sense, *force* could at that time also refer to an inner, mental, or moral strength equivalent to fortitude or resistance: "Force

is an other vertue by the whiche a man undertaketh to do or suffer for the love of god these thynges strange and harde" (*Ord. Crysten Men*, 1502).

Sixteenth-century accretions, generally more abstract and more specialized applications of these same sorts of meanings, augmented the idea of the power of moral or nonmaterial factors to influence man ("Mine appetite of lesse force then mine affection," Lyly, *T. Watson's Centurie of Love*, 1582), and added the idea of the power to convince by rational means. The binding power of a law is thus spoken of as "the force of a law," and the "force" of a word, a statement or a document is a designation of its real import or precise meaning (as in Steele's "The Examination of the Force of the Particle *For*," *Tatler* no. 58). From the sixteenth century onward the term is also used to mean the "peculiar power resident in a thing to produce special effects," as in Shakespeare's "On whose eyes I might approue This flowers force in stirring loue" (*Mids. N.*, 1590).

Even in this highly simplified version of the history of the term, then, there are crosscurrents of physical and metaphysical significations and among them are implications that force might be inherent in people or things, might be characteristic of them and their effects, that it might be necessitous in its operation, that it might be menacing or heroic, that it might be intentional and even rational. If the "force" represented in all these pre- and extrascientific significations were to be conceived of as a single thing manifested in these various ways, the metaphysical implications would be stupendous: Force would be a thing of pure efficaciousness, indwelling and universal, not unlike a deity.

Strictly speaking, of course, force is in no sense an actual, verifiable thing but a nonempirical concept, a habit of expression we often fall into when we refer to relationships or attributes of things or people. It is nonetheless a powerfully vivid and suggestive concept, one which seems specific, personal, and immediate. It certainly *seems* as if force were experienced directly, and this peculiarity of the term is an important factor in its extensive elaboration in the nineteenth century. In 1800 no less than now, it seems rooted in every individual's personal experience. I force something, something forces me: the experience of force seems immediate and undeniable. The term asserts something about causation—something was made *to happen*—and something about necessity—something was *made* to happen. If I push an object across the top of my desk, I have a paradigmatic "force" situation. I am clearly aware that the object moves because I push it, and aware that it cannot not move unless my force ceases or is opposed by some greater one. I am aware of my intentions and my expenditure of energy as well as my effect on the object. When I feel "forced" in some way, I feel like I think that pushed object might feel. One of our most typical linguistic habits is to refer to such events as transactions in