

CHRISTOPHER MARLOWE'S TAMBURLAINE THE GREAT

AND ELIZABETHAN SCIENTIFIC CONTEXTS

by

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DEDICATED TO THE MEMORY OF

Dr. Kester Svendsen

Yet once more, O ye laurels, and once more,
Yet myrtles brown, with ivy never sere,
I come to pluck your berries harsh and crude,
And with forced fingers rude
Shatter your leaves before the mellowing year.
Bitter constraint and sad occasion dear
Compels me to disturb your season due;
For Lycidas is dead, dead ere his prime,
Young Lycidas, and hath not left his peer.
Who would not sing for Lycidas?

--Milton, "Lycidas," 1-10.

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CHAPTER 1

No two terms better exemplify the altered assumptions of Elizabethan literary scholarship than the words "aspiration" and "ambition." While critics once assumed that the Elizabethan age participated fully in the bold, secular spirit of the Burkhardtian Renaissance, they are now prone to assume that the period resembled rather than differed from the medieval. Far from being a period of intellectual iconoclasm, the Elizabethan age was Aristotelian in its physics and conservative in its morality. Within this context, there was little room for a positive affirmation of aspiration. Contemporary studies of Christopher Marlowe's Tamburlaine the Great demonstrate the consequence of this revaluation. Marlowe is credited with introducing to English drama a new dramatic character, the aspiring hero, and the examination of his Tamburlaine centers on whether Marlowe intended him to be admirable or reprehensible. In one of the most recent studies of Marlowe, W. L. Godshalk argues that Marlowe is a social critic who embraces a conservative morality, one based on order.¹ Godshalk argues "if Marlowe did not see the essential social evils of sixteenth-century Europe, he certainly was not a very perceptive young artist" (Godshalk, p. 34). To elucidate his concern with the erosion of morality, Marlowe presents "an inverted world, where evil has become dominant and, in many cases, has been accepted in the place of good" (Godshalk, p. 36). Although Marlowe is "never a preacher, but always a seer" his moral vision makes his drama "a warning against the quest for infinity" since

he demonstrates that "aspiring evil ultimately destroys itself" (Godshalk, p. 37).

While Godshalk assumes that Marlowe assigns a negative value to aspiration, Irving Ribner argues that Marlowe's attitude towards aspiration reveals his development from intellectual rebellion to doubt. In his recent edition of Marlowe's plays, Ribner assumes that the early work "allies Marlowe to the currents of Renaissance skepticism which were challenging the medieval notion of a harmonious creation ruled over by the providence of God."² Marlowe joins with the skeptics who "exalt the power of man to control the universe by his own strength and reason, without regard to divine influence. They see nature not so much as the reflection of divine will, but as something governed by immutable laws which may be studied; nature can be controlled once these laws are understood. They envision man as the potential master of his environment" (Ribner, p. xxx). Marlowe cannot sustain his optimism, however. While his Doctor Faustus "does not preach a pious submission to divine law," it is nonetheless "a pessimistic statement of the futility of human striving" (Ribner, p. xxxvii). By the end of his career, Marlowe writes "not of Christian certainty, but of agnostic intellectual confusion" (Ribner, p. xxxvii). Marlowe moves from an excited espousal of aspiration to an intellectual failure of nerve. In Ribner's view, Marlowe's belief that it "is in the nature of mankind to yearn" led him first to abandon a Christian belief in order, and then to fail at enunciating any "real principle of order in the universe" (Ribner, p. xl).

The contradictions in these two interpretations arise from the assessments of Marlowe's attitude towards aspiration. Both critics assume the dominant morality of the period was conservative and that ambition was regarded with disdain. Godshalk assumes Marlowe embraced this morality and believed ambition was sinful. Ribner assumes Marlowe admired aspiration, and that he was therefore in rebellion with his age. Once he cast off his intellectual moorings, Marlowe was left without a moral or intellectual context and his later plays reveal his alienated confusion. It occurs to neither Godshalk nor Ribner that aspiration was a generally accepted facet of human nature.

The criticism by Godshalk and Ribner indicates how thorough has been the revaluation of the Renaissance in England. Their contrasting opinions reveal as well the polarity typical of Marlovian criticism. Despite the consensus about the period, critics of Tamburlaine cannot agree on Marlowe's intent. His treatment of aspiration rather stubbornly fails to yield satisfactorily to either one of these critical approaches. Since the persistent contradictions in Marlovian criticism derive from the shared preconceptions about the Elizabethan Age, it is important to establish the historical approach which gave rise to it. The name E. M. W. Tillyard is often used as a shortcut to this assessment. His popularization of the Elizabethan world-picture formulated by A. O. Lovejoy epitomizes the conception of a stable, hierarchic, and essentially medieval Christian morality that serves as a benchmark against which is measured the morality of poets like Marlowe. While this use of Tillyard is convenient, it does a disservice to Tillyard himself, since as Herbert Howarth observes, "Tillyard would have been ✓

horrified by the consequences of his ambitious books. He knew that there was much in Shakespeare that lay outside his theory."³ Howarth goes on to deplore the conversion of Tillyard's world-picture into a "formula or 'net' through which all the literature of the Renaissance is viewed" (Howarth, p. 40).

As Howarth suggests, the use of Tillyard is distressing because his ideas have been crystallized into doctrine. He further suggests that Tillyard's popularity is less a consequence of ideas intrinsic to the Renaissance than of modern angst:

Tillyard's Elizabethan world-picture is the work of a man appalled by the disintegration of a familiar Europe under the collisions of the thirties and the Second World War. It is a cry against chaos, a fantasy of order re-established. The ready acceptance of it shows how much the academic world of the forties shared his nostalgia. It has become gospel, and its limitations have been forgotten in these subsequent years of use and over-use.
(Howarth, p. 40)

Howarth's reference to nostalgia may derive from Tillyard's closing statement in The Elizabethan World Picture:

we shall err grievously if we do not take that seriousness into account or if we imagine that the Elizabethan habit of mind is done with once and for all. If we are sincere with ourselves we must know that we have that habit in our own bosoms somewhere, queer as it may seem. And, if we reflect on that habit, we may see that (in queerness though not in viciousness) it resembles certain trends of thought in central Europe, the ignoring of which by our scientifically minded intellectuals has helped not a little to bring the world into its present conflicts and distresses.⁴

While Tillyard is obviously critical of modern scientific attitudes, his interest in identifying the Renaissance with medieval values reflects a general scholarly dissatisfaction with Burkhardt as much as a nostalgia for order.

Under the dominant influence of Burkhardt, the Renaissance came to be understood not as simply the rediscovery of ancient learning, but the emergence of modern secular man. Walter Pater and J. A. Symonds exercised their considerable stylistic skill in communicating their excitement over this birth of the heroic individual. There was an inevitable reaction. Scholars sought to readjust the view of the Renaissance by examining its medieval antecedents, and W. K. Ferguson assigns this shift to a revolt against the exuberant and monolithic view fostered by Burkhardt.⁵ Tillyard identifies himself with this revisionist tendency:

But though the general medieval picture of the world survived in outline into the Elizabethan Age its existence was by then precarious. There had been Machievelli to whom the idea of a universe divinely ordered throughout was repugnant, and in the seventeenth century men began to understand and heed and not merely to travesty and abuse him. Recent research has shown that the educated Elizabethan had plenty of textbooks in the vernacular instructing him in the Copernican astronomy, yet he was loth to upset the old order by applying his knowledge. The new commercialism was hostile to medieval stability. The greatness of the Elizabethan age was that it continued so much of the new without bursting the noble form of the old order.

(Tillyard, p. 8)

Tillyard argues that the Elizabethan period nurtured the new while conserving the old. He seems, therefore, to be calling for little more than a balanced appreciation of historical process. He tips the balance, however, by observing that the nature of Tudor monarchy necessitated the maintenance of the medieval world picture: "They were part of the pattern and they made themselves indispensable. If they were to be preserved it had to be as part of this pattern" (Tillyard, p. 8). Tillyard's assertion that the Elizabethan age derived its "greatness"

from its ability to conserve "the noble form of the old morality" confirms Howarth's intuition of Tillyard's nostalgia, although the accuracy of Howarth's assessment is undercut by Tillyard's argument that the medieval concepts were preserved for reasons primarily political rather than moral.

Even granting Tillyard's personal predilection for order and hierarchy, his thesis seems to promise a balanced view of the period, aimed at correcting the one-sided view of the Renaissance derived from Burkhardt. The difficulty with his book is his failure to fulfill his promise. The Elizabethan World Picture rather persistently emphasizes not the tensions inherent to the period, but the unanimity with which the medieval physical and moral cosmology was adopted. Even when the mood darkens decidedly, as in Webster's Duchess of Malfi, Tillyard refuses the idea that the period underwent an intellectual crisis. Webster and his fellow Jacobean playwrights could write their dark dramas precisely because their moral environment was stable and secure (Tillyard, p. 20).

Tillyard rather obviously engages in special pleading, and W. R. Elton has listed the consequent historical distortions:

Revaluation now of Tillyard's handbook might, outweighing its merits of religious emphasis and convenient concision, include such defects as the following: (1) underestimation of the complexity and fluidity of Renaissance religious developments; (2) in particular, omission of Reformation influences . . . ; (3) neglect of sixteenth-century skeptical revivals, as well as the role of renewed Epicureanism, pagan syncretism, the new science, exploration, etc.; (4) despite his claim "always to choose the most usual opinion" . . . a lack of methodological awareness--Hooker is taken as the norm of "average belief," while such figures as William Perkins and Henry Smith are ignored--a defect apparently related

to an unfamiliarity with the Short-Title Catalogue; (5) confused sense of chronology, the middle ages, and the sixteenth, seventeenth, and eighteenth centuries being impressionistically juxtaposed; (6) parti pris defense of the favorite, yet highly ambiguous, fetish term, "order," without adequate definition; (7) a priori application of vague and unhistorical criteria for literary "eminence" . . . ; (8) consequent miscomprehension of Elizabethan . . . drama whose "violence . . . has nothing to do with a dissolution of moral standards . . ."; (9) in general, blandly reductive and unsupported generalizations with reference to "the Elizabethans," which tend to make this a kind of intellectual Lambs' Tales from Shakespeare, Shakespeare a type of Stratford Dante, and Tillyard's summa itself a collection of stale and undigested crumbs from A. O. Lovejoy's familiar layer-cake universe.⁶

Elton is clearly engaging in his own special pleading. His remarks are out of proportion to Tillyard's slim handbook; they aim not simply at Tillyard, but at the influence Tillyard has exerted. Understood as a criticism of Tillyard alone, Elton's remarks constitute intellectual overkill. But when his list is used to assess the historical methods of those who came after Tillyard, his criticism is germane.

A particularly illuminating example can be found in Herschel Baker's two studies of sixteenth and seventeenth century English intellectual history.⁷ His work more than Tillyard's suggests the nostalgia perceived by Howarth, since Baker assumes no organic connection between the Renaissance and the modern period. The latter signalled a clear break from the values of the former. Arguing "the more we study the Renaissance the more we come to understand its fundamental conservatism" (Baker, Wars, p. 1), Baker points to Spenser and Hooker as exemplars of the Renaissance genius for "synthesis and compromise" within the framework of the Christian tradition. This unity did not last beyond the sixteenth century: "But when the synthesis at last

dissolved and the compromise inevitably shattered, the Renaissance was over, and the advent of the modern world was at hand" (Baker, Wars, p. 3). The discontinuity of the modern period results from the "negative and avant-garde aspects of the epoch between Petrarch and Milton" which overturned "the positive and traditional" values of the previous "two thousand years" (Baker, Dignity, p. 204). The new currents were negative because they made it "impossible for man to persist in his old assumptions; after the seventeenth century of thinking man either had to forego his complacency or find shockingly new grounds for maintaining it" (Baker, Dignity, p. 204).

Baker indulges in what Elton would call a "defense of the favorite yet highly ambiguous fetish term, 'order.'" In developing his thesis that the Renaissance flowed in the mainstream of medieval thought, Baker finds it necessary to exclude certain aspects of the period from his study:

This is to ignore such crucial developments as the new science and sixteenth-century skepticism, both factors tending to disrupt the traditional view of man. Ultimately they would require a complete revaluation both of man and of the universe of which he had for so long fancied himself the crowning glory. But such a revaluation belongs to the seventeenth century--a genuine turning-point in the history of thought and a far more significant break from the Renaissance than the Renaissance had been from the Middle Ages. Copernicus, Bruno, Bacon, Montaigne of the great Apology, and Shakespeare of the tragedies reflect those nascent attitudes presently to fructify in the seventeenth century, but like all geniuses they were both of their time and ahead of their time. Although they are unthinkable out of their historical context, they either anticipate later developments or announce the fracture of the values still unquestioned by lesser contemporaries. The history of their ideas belongs more properly to the century of Galileo and Locke than to that of Calvin and Spenser.

(Baker, Dignity, pp. 103-104)

Baker here frankly admits that his preference for understanding the Renaissance as medieval in its outlook and conservative in its values leads to a distortion of historical data. He adopts a cavalier attitude towards dating. Copernicus published the De Revolutionibus in 1543; Bruno his important works on infinity in 1584; Bacon The Advancement in 1605; Montaigne wrote The Apology between 1575 and 1580; and Shakespeare wrote the tragedies under two monarchs. Despite his awareness that these figures "are unthinkable out of their historical context," and his knowledge that their dates span nearly a century, Baker dismisses their importance to the sixteenth century. They were geniuses all, and their thought can best be understood as presaging the seventeenth century rather than as reflecting sixteenth century values.

Baker's approach could be chastized in Elton's terms for its "lack of methodological awareness" and a "confused sense of chronology" (Elton, p. 40), but it is nonetheless useful because Baker rather clearly defines his prejudices. He assumes that the tradition, order, continuity, and moral consensus characteristic of the Renaissance was first challenged and then overthrown by the new science and skepticism. For this reason, he insistently dismisses the new science from his evaluation. Since science made its impact in the "century of Galileo and Locke," and not before, it is the source of the discontinuity between the Renaissance and the modern era. Science contains within it the devastating challenge to a world defined by value rather than by measurement, and it therefore could not have been a factor in the Elizabethan intellectual attitudes.

While his assignation to science of a disruptive role reveals Baker's bias, it is not peculiar to him. We have noticed, for instance, Tillyard's equation between the narrowness of "scientifically minded intellectuals" and the failure of perception which has "helped not a little to bring the world into its present conflicts and distresses." Intellectual detachment or scientism has failed because it discounts the morally unifying tendency of "the Elizabethan habit of mind" (Tillyard, p. 109). Hardin Craig in The Enchanted Glass (New York: Oxford University Press, 1936), states an anti-scientific bias even more explicitly:

Newton and his followers had not yet given new meaning to matter, space, and time in terms of forces, motions, changes in mass, temporal and spacial continua, and the like. Indeed, the advancement of science was not as yet a stated problem. Man looked out on a static world of nature present and intelligible to his mind and causally explicable in terms of his own good. He had not yet been demoted from his determinative position in the centre of the universe as the being for whom all things had been made and to whom had been granted the mastery and enjoyment of all things in return for a becoming glorification of an utterly generous Creator.

(Craig, p. 8)

In the theologically secure cosmology of the Elizabethans, man had "mastery and enjoyment," and was under the special care of "an utterly generous Creator"; science "demoted" man from this position. Given the terms of his argument, it is clear that Craig joins Baker in assuming a non-organic, discontinuous historic process. Science broke the chain of tradition and Craig even more than Baker or Tillyard reveals his nostalgia for that lost past: "A cosmology which is impersonal, scientific, such as that which supplies us with our starry universe and our physical nature will certainly seem coldly noncommittal compared with

the cosmology of the Renaissance" (Craig, p. 30). In Elizabethan cosmology "the physical and the spiritual, the factual and the doctrinal, the casual and the purposeful were, to a far greater degree than in the modern world, of one piece" (Craig, p. 30).

Craig, Tillyard, and Baker perceive similar historical patterns: the Renaissance looked backwards to the medieval period for its values; it was possessed of cultural unanimity founded on Christian virtues; the Elizabethans thought differently than do moderns; and science was a singularly disruptive factor. These arguments are founded on the assumption that the Elizabethan period prized above all else a sense of redundancy in the orderliness of physical and human nature. This premise gives rise to the critical errors formulated by Elton precisely because it necessitates the assumption of historical discontinuity and the concomitant argument that Elizabethans had minds essentially different from the modern. The modern mind, indoctrinated to the assumption that scientific technology allows dominance rather than reciprocity towards nature, has been fatally severed from its past. Such a conception of history means removing from the field of inquiry aspects of the Elizabethan age that contributed to the development of both modern science and the conception of the individual as capable of dominating his environment.

This selectivity is evident in numerous studies of the Elizabethan age. James Winny, for example, reiterates the assumption that the Elizabethan mind was essentially different from the modern:

What distinguishes Elizabethan outlook is not merely its assumption of a meticulous universal design, but the kind of order which its philosophy envisaged. An

eighteenth-century scientist would have considered that he had proved the innate orderliness of the universe when he had shown its unvarying obedience to the recently formulated laws of Newtonian physics. An Elizabethan's proof would have depended upon metaphysical argument in which exact observation or measurement played no significant part.⁸

Even those critics who are specifically interested in the impact of science have, until recently, tended to argue for the discontinuity and disruption occasioned by science. R. F. Jones, who in his Ancients and Moderns made a substantial contribution to the study of science and society, dates the emergence of science with Francis Bacon: "To speak of the scientific attitude of the Elizabethans is, perhaps, to do violence to words, for certainly, with a few notable exceptions, they manifest no attitude which could by modern standards be so described. . . . Bacon's task and achievement can be justly appreciated only when cast into relief against the background of his age."⁹ Jones characterizes Elizabethan science as slavishly subservient to classical learning, particularly to Aristotle, and as disinterested in observation and experimentation: "They restricted the study of nature to the narrow confines of a library, and tested the truth of scientific theory by the names on the title page" (Jones, p. 9). Mathematics was a neglected science, and although the voyages of discovery required changes in maps, the cartographers were humbly apologetic for deviating from ancient knowledge (Jones, p. 11).

Although Jones first voices these conclusions in 1936, time has not diminished his conviction. In the preface to the 1961 edition, Jones observes:

Much has been done in the history of science in the seventeenth century since the book was first composed, and it is, perhaps, to be regretted that the present edition does not, with rare exceptions, take note of material that may bear upon it. Since, however, these additions to knowledge lie rather near the periphery of the present author's conception of the scientific movement in the way of amplifying and clarifying matters subservient to it, and since, as far as he knows, his general ideas have not been attacked, he has left the text almost entirely in its original form.

(Jones, p. vii)

Jones reiterates his thesis: "Sir Francis Bacon bears the same relationship to the movement under discussion as, for example, Karl Marx bears to the development of Communism, but, of course, to much better purpose" (Jones, p. viii). Nothing in the years intervening the first and second edition has altered Jones's assumption that the word "science" cannot be meaningfully applied to activities in the Elizabethan period. Elizabethans approached nature in different terms than does post-Baconian man.

While Marjorie Nicolson, who has contributed more than any other to this branch of literary study, does not date the emergence of modern science with Francis Bacon, she similarly dismisses the importance of Elizabethan science. She makes some concession to the work of Digges, Dee, and Harriot, but she dates the impact of the new science on literature from the publication of Galileo's Siderius Nuncius (1604), and identifies it as an essentially foreign influence: "No matter how interesting and important, then, were these early observations of Digges and Harriot, there is no question that the real stimulation of imagination in England among poets, philosophers, churchmen, came rather from the Italian than from the native astronomy."¹⁰ Nicolson,

like Jones, perceives science as an essentially disruptive element--leading to the breaking of the circle--and assigns its impact to the seventeenth century.

The specialized studies of Jones and Nicolson, along with the discussions of intellectual history offered by Craig, Tillyard, Baker, and Winny indicate how thorough has been the reassessment of the Burkhardtian vision of Renaissance man as one stimulated by new ideas, secular in his interest, and proudly self-assertive. The reassessment has proved particularly devastating to those who perceive in the Elizabethan age a struggle to discard intellectual constraints. Harry Levin, for instance, in The Overreacher (Cambridge: Harvard University Press, 1952), assumes that Marlowe's portrait of Tamburlaine is intended as a positive treatment of aspiration. He is intimidated, however, by the vision of the Renaissance as an age of derivative values: "The extent to which he [Marlowe] was a man of his epoch . . . depends on the view that historians take of that epoch; and, since the days of that impassioned Marlovian, J. A. Symonds, their emphasis has shifted decidedly" (Levin, p. 1x). Levin chafes at Tillyard's "scholarly preference for stressing continuities at the expense of novelties" (Levin, p. ix), and argues somewhat hesitantly for an alternative view of the age:

"Its great achievements," so the late Ernst Cassirer wisely summarized the controversy over the Renaissance, "lay much less in the new content it created--although that too is infinitely rich--than in the new energies it awakened and in the intensity with which these energies acted." This could also serve as an apt description of what might be called the Marlovian impetus. The doubts and aspirations that Marlowe voices, the esthetic impulses and scientific curiosities, may be less typical

of their time and place than has been commonly supposed; but to that extent he is the more original, and plays an even more strategic role than has been previously recognized. His combination of sensuous perception and speculative intelligence is not to be valued less because it is rare. Civilization is shaped and changed by genius and not by mediocrity--a consideration which intellectual historians, in their preoccupation with norms and survivals and background, sometimes neglect.

(Levin, pp. ix-x)

While he obviously wishes he could do otherwise, Levin concedes the point. He agrees that the Marlovian impulses "may be less typical of their time than has been commonly supposed," and like Baker, Levin applies the term genius to a figure whose ideas are incompatible with historic preconceptions. Marlowe's example is "rare" and does not participate in the normative--and mediocre--values of his age.

Levin is not alone in adopting this strategy. Paul H. Kocher (Christopher Marlowe, Chapel Hill: University of North Carolina Press, 1946) also feels Marlowe embodies a new spirit in his plays, but Kocher acknowledges it was unusual: "He became one of the spokesmen of a tendency. For free thought was stirring in England in a vague, unorganized way in the last fifty years of the century. Underneath the intonations of the orthodox writers, one can hear it rising, this mutter of dissidence. For the most part it was scattered and anonymous. But in Marlowe we can see the quintessence of it drawn together and revealed" (Kocher, p. 68). Although Kocher does not justify his interpretation of Marlowe by labelling him a genius and thereby wrenching him from his historical context, he does argue that the period offers no intellectual background for Marlowe's ideas. The "mutter of dissidence" was "anonymous," and Marlowe was unique because he could

clearly articulate it.

Kocher evidently identifies the intellectual rebellion as anonymous out of his desire to dissociate Marlowe from the School of Night (Kocher, pp. 6-18). He therefore discounts Marlowe's participation in any organized heterodoxy. But Muriel C. Bradbrook uses the School of Night as a way of carving out of the Elizabethan period a niche in which to place the novel ideas of Raleigh, Marlowe, and Chapman. In her study The School of Night (Cambridge: Cambridge University Press, 1936), Bradbrook assumes the age was not generally receptive to the ideas examined by the School: "The doctrine of the School of Night was, and has remained, a matter in which all outsiders are Peeping Toms" (Bradbrook, p. 53). It was a club for the avant-garde who feared censure by a public suspicious of "free intellectual inquiry" (Bradbrook, p. 53). The ideas explored by Marlowe, argues Bradbrook, seem amenable to the modern temper, but such sentiments as Mephistophilis expresses-- "All places shall be Hell that is not Heaven"--are unorthodox and would be heretical and blasphemous" to Elizabethan ears (Bradbrook, p. 111).

Bradbrook indicates her tacit acceptance of the arguments supporting Elizabethan conservatism. Those ideas which resemble modern sensibilities were essentially foreign elements to the Elizabethan age. They must necessarily have been regarded with suspicion, and were of interest only to an elite group of courtiers and the artists they patronized. Bradbrook's treatment of Marlowe and his age does not differ in its essential premise from that of Levin or Kocher. And, as we have seen, Ribner makes a similar concession to historical assumptions. Since he assumes Marlowe was not an apologist for his age,

he is obliged, according to the formula, to argue that Marlowe was rebellious, and lacking an intellectual context in which to place his discontent, he left himself bereft of any value system.

Thus the dominant influence of what may conveniently be called Tillyard's Elizabethan world-picture has led critics of Marlowe to assume that if Marlowe is not an apologist for his age, then he is necessarily part of an intellectual underground. Since he probes the limits of human potential, and portrays in glittering spectacle the aspiring hero, Marlowe presents a particularly difficult problem. Ambition, aspiration, dominance, and self-aggrandizement result from the modern assumption of man's superiority to nature; therefore, Marlowe cannot be participant in the mainstream of Elizabethan thought if he sanctions these impulses. The only alternative is exemplified by Godshalk. Marlowe must be presenting his vision of the moral abuses to the conservative values he embraced. Consequently Marlovian criticism is characterized by contradiction, and the confusion arises out of the particular terms in which the Elizabethan period is understood.

When considered in light of non-literary scholarship, this confusion seems particularly unfortunate, since it ignores or dismisses those features of the Elizabethan age that do not conform to an understanding of the period as a kind of cultural monolith. Historians not specifically interested in formulating a context for literary studies have argued for some time against such a view of the period precisely because it necessitates an assumption of discontinuity between the sixteenth and seventeenth centuries. In his seminal study, Astronomical Thought in Renaissance England (Baltimore: Johns Hopkins

Press, 1937), Francis R. Johnson sought to provide a corrective:

The influence of the scientific movement on literature and ideas in the English Renaissance has received the increasing attention of scholars in recent years, yet thus far little has been known at first hand of the scientific writing of that age. Most studies have confined themselves chiefly to the literary and philosophical works when dealing with the century and a half preceding the first gatherings of the group of scientists who later founded the Royal Society. The purpose of this volume, on the other hand, is to survey the English writings on science from about 1500 to the mid-seventeenth century, in order to chart the course of astronomical thought in scientific circles during that significant period of transition from the old cosmology to the new. It will therefore present the results of a first exploration in territory hitherto almost wholly uncharted.

(Johnson, p. vii)

Johnson is specifically interested in the Elizabethan contributions to the acceptance of Copernicanism, and he provides a careful and illuminating survey of scientific inquiry during the Elizabethan period. Although he asserts that their arguments were available to the general public in the vernacular, he is not interested in assessing the cultural impact of science; nor is he particularly concerned with technical developments unrelated to the acceptance of heliocentricity. But his is an extremely valuable study by reason of his argument that Elizabethan science drew upon the Neo-Platonist revival for theoretical and mathematical premises, and his confidence that activities in the Elizabethan period contributed to the important breakthroughs in the seventeenth and eighteenth centuries.

Johnson's interest in Platonism was anticipated by Edwin Arthur Burtt in his Metaphysical Foundations of Modern Physical Science (1925). Copernicus made his most profound contribution, argues Burtt, in his

assumption that mathematics is the key necessary to understanding the essential harmony of the universe. His ideas derived from the Neo-Platonist revival, and were therefore part of the Renaissance reaction against Aristotle. While Aristotle assumed number was accidental rather than essential, the Pythagorean-Platonist argued that the universe is fundamentally geometrical because it is harmonious. This Platonist influence is found in Cusa, Novara, and Kepler as well as Copernicus, and contributed to the essential premise of modern science, that mathematics is necessary to the elucidation of natural law.¹¹

Burt's insistence on the importance of Pythagorean-Platonism to the emergence of modern science has been reiterated by those who came after him. In his essay on the nature of the Renaissance (The Age of Adventure, Boston: Houghton Mifflin Company, 1957), Giorgio DeSantillana observes:

From the laboratory of Renaissance poetry, from the innumerable images meant to assist in evoking the true nature of something, there emerges the indication that the clock is being set back to some kind of Platonic realism, that is, the belief in the reality of ideas, as against hard-headed late medieval Nominalism; and indeed this is what we find also in the most characteristic strain of philosophical thought in the fifteenth century, the Platonism of the Florentine Academy. This "realist" attitude normally occurs where philosophy has struck some new and fertile ground; it is tantamount to a belief in what one is doing. Our age is, in philosophy, the "age of analysis"--it prides itself again in extreme Nominalism--yet our thought is inescapably tinged with Platonic realism for what concerns the time and space of General Relativity, or the entities in the Freudian Unconscious, or the nature of the atomic nucleus, just as the nineteenth century had a "realist" attitude, from different sides, with respect to Matter, or the Hegelian Spirit, or Progress, or the electro-magnetic ether.

(DeSantillana, p. 25)

DeSantillana insists upon the continuity of those metaphysical ideas essential to modern physics. Pythagorean-Platonism provided a conceptual framework for generating basic theoretical premises, and modern science benefits from this legacy no less than Copernicus, Galileo, and Kepler who owed their contributions to the assumption that "the world is a perfect work of art and that the clues to unravelling its complexities must be sought in beauty, simplicity, and symmetry" (DeSantillana, p. 24).

The importance assigned to Platonism by Johnson, Burt, and DeSantillana indicates that while the Renaissance looked backwards for its intellectual framework, it looked to Plato. This assessment of Plato is particularly important because it demonstrates that ideas counter to the Aristotelian physics co-existed with the Ptolemaic cosmography; that is, the ideas associated with Platonism began to have a profound influence before the general acceptance of Copernicus. Frances Yates makes this argument succinctly. She observes, as does Santillana, that Pythagorean-Platonism was soon implicated with a revival of number magic; and while the astrologer or Magus premised his studies on geocentricity, he nonetheless gave different emphasis to the role of man: "The cosmos, or the world picture, within which the Agrippan Magus operates is not different, in its main outlines, from the medieval world picture. . . . What has changed is Man, now no longer only the pious spectator of God's wonders in the creation, and the worshipper of God himself above the creation, but man the operator, Man who seeks to draw power from the divine and natural order."¹² Yates argues that this changed conception was the singular contribution made

by the Renaissance to the ideas received from the Greek, and argues that it derives from the way in which Neo-Platonism and the related Hermeticism influenced the conception of magic:

Fundamentally, the Greeks did not want to operate. They regarded operations as base and mechanical, a degeneration from the only occupation worthy of the dignity of man, pure rational and philosophical speculation. The Middle Ages carried on this attitude in the form that the theology is the crown of philosophy and the true end of man is contemplation: any wish to operate can only be inspired by the devil. Quite apart from the question of whether Renaissance magic could, or could not, lead on to genuinely scientific procedures, the real function of the Renaissance Magus in relation to the modern period (or so I see it) is that he changed the will. It was now dignified and important for man to operate; it was also religious the not contrary to the will of God that man, the great miracle, should exert his powers. It was this basic psychological reorientation towards a direction of the will which was neither Greek nor medieval in spirit, which made all the difference.

(Yates, pp. 155-56)

The implication of Neo-Platonism for a revaluation of the human potential is clearly enunciated by Yates. While the Tillyardian school assumes that aspiration was a singularly inappropriate impulse, Yates argues it is the hallmark of the Renaissance. She therefore provides a theoretical framework for Burkhardt's social anatomy.

But Yates's comments indicate a significant weakness in her conception of the period. She assigns to the Hermetic texts the source for the changed conception of human nature adopted by the Magus. Her study therefore concentrates on one specialized aspect of the Neo-Platonist revival. This narrowness makes it difficult for her to argue that these ideas were widely received or generally acknowledged. She is not alone in this difficulty. The studies of Platonism and science generally concentrate on the original contributions made by

theoreticians like Copernicus, Bruno, and Kepler to the history of ideas. They are not concerned with identifying the specific cultural impact of these ideas. While the arguments for the Platonist influence strongly suggest that Pythagorean-Platonism led to an awareness of the essential importance of number, and that science in the Renaissance therefore contributed to a redefinition of the relationship between man and nature, the link between the theoretical construction and practical implementation is missing. Paul Oskar Kristeller is particularly sensitive to this lack: "If the Platonist views of mathematics played a role in the rise of mathematical physics (as I think they did), the credit goes to some sixteenth century Platonist philosophers and mathematicians, but not to the Florentine Academy which merely made the relevant texts of Plato and of other ancient authors available."¹³ Kristeller does not discount the contribution of Copernicus to this process, but he is nonetheless concerned with establishing how Pythagorean-Platonism interfaced generally with Renaissance culture, and how scientific methodology and assumptions arose from it.

Establishing this link is particularly important, for without it, historians have the seed but not the soil. It is possible to identify ideas not premised on Aristotle which posit a new conception of the human will and the human potential, as well as a different relationship between man and physical nature. These ideas will necessarily be identified as nascent but not fully influential unless it is possible to argue that social conditions were particularly receptive to them. This is essentially the quandry facing Bradbrook. She accepts the argument that Hermeticism altered the conception of man, but she

must confine the social context for these ideas to a very narrow school and identifies them as heterodox. Thus, while Yates's inquiries suggest a positive attitude towards human aspiration, critics of Elizabethan literature cannot assume from her arguments that aspiration was generally applauded. The context is too narrow, and requires strategies similar to those adopted by Levin, Kocher, and Ribner.

There has existed for some time an historical approach capable of widening this context, but it has been generally ignored. It involves an examination not of the geniuses of the age, but of those engaged in applying scientific technic to practical problems with the intention of improving social and economic conditions. While the importance of technic to the acceptance of science has been recognized in studies of Francis Bacon's influence, and of the Royal Society, it has until recently been ignored by students of the Elizabethan period. This has been the case despite Johnson's assertion as early as 1937 that vernacular texts on science were widely available in England. Even before Johnson, Katherine Maynard identified in English economic needs the impetus behind scientific advances: "Already known as a 'merchant island,' with a rising middle class, more readers, and a general eagerness for change and adventure, England was prepared to reward the invention of anything that contributed to her prestige or prosperity. The stimulus to scientific investigation therefore lay in the direction of improved implements of war, aids to navigation and better means of communication."¹⁴ Raymond Phineas Stearns, writing in 1943, combined Johnson's theoretical interests with Maynard's interest in the connection between technic and society. Arguing that Elizabethan science

was influenced by Roger Bacon and by Pythagorean-Platonism, and benefited from a benign religious climate, he observes that the emerging middle class was interested in any technical advancement that would help make a profit. The interest of merchants and investors in these improvements was enhanced by the general availability of scientific writings in the vernacular.¹⁵

This link between science and technic has been examined by later historians. Lynn White, for instance, argues that the technical advantages derivative of scientific inquiry had an ameliorative effect on the traditional cultural fear of change even before the new scientific epistemology was fully appreciated:

Because they were saturated in a Greco-Latin classical education, a high proportion of the upper class continued to idealize the distant past until the very end of the century when the "quarrel between the Ancients and the Moderns" corroded ancestor worship in their thinking. It is my impression that somewhat earlier in the century less educated folk began to absorb an admiration for change largely because they came to realize that much of the gadgetry that was making daily living so much more convenient had been quite unknown to the ancients.¹⁶

The importance assigned by White to the social impact of an improved technic is found as well in Christopher Hill's The Intellectual Origins of the English Revolution (Oxford: Clarendon Press, 1965). Throughout his first chapter, "London Science and Medicine," Hill emphasizes the close connection between the development of practical science, the rise of the vernacular, the criticism of the universities, and the interest in science by the aggressive middle class:

before Bacon began to write an intellectual revolution was under way. The utilitarian value of science as a means for the relief of man's estate on earth was being glorified; some men accepted the idea of progress through

science, and of co-operation between the humblest craftsman and the scientist. . . . It was still true, as Bacon wrote in the Novum Organum, that "men have been kept back as by a kind of enchantment from progress in the sciences by reverence for antiquity." But the more intelligent merchants and craftsmen had already discovered that they needed an up-to-date astronomy and mathematic if they were to navigate ships, drain mines, and measure lands accurately.

(Hill, pp. 69-70)

Hill's interest in the economic impetus behind scientific advance reflects his methodology. He assumes the pre-Revolutionary period in England cannot be accurately assessed by attention exclusively to the great minds who articulated the interests and attitudes of their culture:

Ideas do not advance merely by their own logic. . . . Ideas were all important for the individuals whom they impelled into action; but the historian must attach equal importance to the circumstances that gave these ideas their chance. Revolutions are not made without ideas, but they are not made by intellectuals. Steam is essential to driving a railway engine, but neither a locomotive nor a permanent way can be built out of steam.

(Hill, p. 3)

Nonetheless, Hill does not purport a careful examination of technical achievement. While he is cognizant of its contribution to emergent ideas, he is primarily interested, as he says, in "dealing with the steam," or the ideas rather than the process by which they were implemented.

Hill's approach is not unusual. As we have seen, Maynard, Johnson, Stearn, and White share Hill's confidence that an examination of technic will reveal the crucial link between culture and the new ideas about human nature associated with science. But none of them undertakes a careful examination of this process. Credit for this kind of examination must be awarded to the important studies of

E. G. R. Taylor¹⁷ and Commander D. W. Waters.¹⁸ They focus on the relationship between the work of English scientists--Robert Recorde, Thomas and Leonard Digges, John Dee, Thomas Hariot, and others--and improvements in England's maritime technology. Their studies reveal how much the development of science in England depended upon the emergence of a new class of skilled technicians, trained in mathematics and its practical applications. While they do not engage in an explication of the theoretical foundations of science, they do reveal the tremendous scientific activity in technical fields, the essential contribution made by science to England's rapid emergence as a dominant maritime nation, and suggest as well the extent to which scientists of the period relied upon practical mathematics, observation, and experimentation. Two aspects of their approach are particularly important as correctives to common assumptions about the period. Taylor and Waters demonstrate that Jones is incorrect when he maintains the term "science" cannot be legitimately applied to the Elizabethan period. They demonstrate as well that an appreciation of scientific development need not rely on dating the acceptance of Copernicus, or the impact of the telescope. The essential features of the new science--a reliance on mathematics, experiment, and observation--were actively employed by those who sought to improve their expertise in mathematical navigation, instrument design and ballistics.

The picture of Elizabethan England that emerges from their combined studies is of a country eager to pursue overseas trade turning for the necessary technic to the practical mathematicians. This perspective on the period suggests a fertile soil for the seeds of the

new science. There are, however, two omissions from their study which prevent a full appreciation of the relationship between scientific theory, a new appreciation of the human potential, and Elizabethan cultural attitudes. The first is that Taylor and Waters are interested more in tracing technical history than in assessing the impact of science on cultural attitudes; the second is that they do not assess the relationship between practical mathematics and its sister science, astrology.

Without this assessment, the receptivity of Elizabethan culture to science cannot be fully appreciated. But once the appeal made by science to its age is understood, and its connection with astrology is examined, a perspective is achieved on Elizabethan England very different from that offered by the Tillyard school. It is the purpose of this essay to examine the cultural implications of science for England between the years 1553 and 1587. A study of Tamburlaine will serve as a demonstration of the kinds of interpretative advantages offered by an awareness of Elizabethan science. The study of the play will not, however, be specifically concerned with tracing influences. The purpose rather is to identify an intellectual and social context capable of accommodating the play without necessitating the identification of Marlowe as either an apologist for a morality based on Aristotelian physics, or as someone in confused rebellion with his age.

To facilitate this examination, the essay is organized into two parts. The first examines those portions of Elizabethan society particularly interested in promoting scientific advancement; the theoretical underpinnings of the practical mathematicians and

astrologers; the efforts made to train young men in mathematical sciences; and the correlation between scientific activity and the attitudes it fostered towards human nature. The second section of the study examines Tamburlaine in terms of the social impact of science, and explores more completely than the first the intellectual contexts of the new science, with particular reference to Platonism and Hermeticism. In general, the intention of the study is to demonstrate that Marlowe need not be wrenched from his historical context in order to appreciate his treatment of aspiration; instead, as this study intends to demonstrate, in Tamburlaine Marlowe examines ideas of immediate and significant interest to his audience. The study of Tamburlaine should, therefore, serve as a demonstration that the Elizabethan age can be elucidated in terms other than those deriving from the reaction against Burkhardt.

Notes

¹W. L. Godshalk, The Marlovian World Picture (The Hague: Mouton, 1974), pp. 33-37.

²Irving Ribner, ed., The Complete Plays of Christopher Marlowe (New York: Odyssey Press, 1963), xxvi-xxvii.

³Herbert Howarth, "The Elizabethan World Picture," The Shakespeare Newsletter, 18 (September-November, 1968), p. 40; see also his The Tiger's Heart (New York: Oxford University Press, 1970).

⁴E. M. W. Tillyard, The Elizabethan World-Picture (1943; New York: Vintage Books, rpt. 1963), p. 109.

⁵W. K. Ferguson, The Renaissance in Historical Thought (Boston: Houghton Mifflin Co., 1948), pp. 329-89.

⁶W. R. Elton, "Professor Tillyard's Tabula Rasa," Shakespeare Newsletter, 18 (September-November, 1968), p. 40.

⁷Herschel Baker, The Dignity of Man: Studies in the Persistence of an Idea (Cambridge: Harvard University Press, 1947) and The Wars of Truth (Cambridge: Harvard University Press, 1952).

⁸James Winny, ed., The Frame of Order (London: George Allen and Unwin, Ltd., 1947), p. 17.

⁹R. F. Jones, Ancients and Moderns, 2nd ed. (1936; St. Louis: Washington University Studies, 1961), p. 3.

¹⁰Marjorie Nicolson, Science and Imagination (Ithaca, New York: Cornell University Press), pp. 33-34; see also The Breaking of the Circle (1950; rev. ed. New York: Cornell University Press, 1960).

¹¹Edwin Arthur Burtt, The Metaphysical Foundations of Modern Physical Science (New York: Harcourt, Brace & Company, 1925), p. 25ff.

¹²Frances Yates, Giordano Bruno and the Hermetic Tradition (New York: Random House, 1969), p. 144.

¹³Paul Oskar Kristeller, "The European Significance of Florentine Platonism," in Medieval and Renaissance Studies, ed. John M. Headly (Chapel Hill: University of North Carolina Press, 1968), p. 216.

¹⁴Katherine M. Maynard, "Science in Early English Literature, 1550-1650," ISIS, 17 (1932), p. 95.

¹⁵Raymond Phineas Stearns, "The Scientific Spirit in England in Early Modern Times (c. 1600)," ISIS, 34 (Spring, 1943), pp. 290ff.

¹⁶Lynn White, Jr., "Death and the Devil," in The Darker Vision of the Renaissance, ed. Robert S. Kinsman (Los Angeles: University of California Press, 1974), pp. 44-45.

¹⁷E. G. R. Taylor, The Mathematical Practitioners of Tudor and Stuart England (Cambridge: Cambridge University Press; for the Institute of Navigation, 1954).

¹⁸D. W. Waters, The Art of Navigation in Elizabethan and Early Stuart Times (New Haven: Yale University Press, 1958).

CHAPTER 2

The problems associated with identifying an author's cultural or social contexts are compounded in Marlovian studies by the difficulties with dating. Contemporary notices of Tamburlaine are often confused, and at least one indicates that either there were modifications in staging now lost to us, or that the reference is to a different play altogether.¹ Moreover, one of the sources for 2 Tamburlaine, Paul Iue's Practise of Fortification (1589), was not published until after the date normally assigned the play.² Cognizant of these difficulties, scholars have generally argued that the sequel was written soon after the first performance of 1 Tamburlaine, and that both plays were first produced between 1587 and 1590, with the earlier date being the more widely accepted.³ This dating is based as much on the assumption that Tamburlaine is an early work of Marlowe's as it is on evidence found in historical documents. These difficulties in dating argue for a conservative approach in assessing the social and cultural attitudes affecting Marlowe most immediately when he composed the play. The year 1587 is a convenient target year, since Marlowe probably did not write Tamburlaine prior to that date, while the ideas then current obtain as well for the years intervening between 1587 and 1590.

One thing seems certain about the original performances of 1 Tamburlaine: they met with immediate audience approval. The Prologue to 2 Tamburlaine declares: "The general welcomes Tamburlaine received,/ When he arrived last upon our stage,/ Hath made our poet pen his Second

Part. . . ."4 The declaration is intriguing and provokes inquiry into what exactly it was about Tamburlaine that delighted his audiences. While Marlowe includes in 2 Tamburlaine episodes dissimilar to any found in the first play--most of which feature his hero's frustrations as a husband and father--Marlowe nonetheless presented in the sequel a play which serves as a showcase for the dominant characteristics of Tamburlaine offered in the first. The features of Tamburlaine's character retained in the second play suggest that Marlowe assumed audiences were particularly interested in Tamburlaine's imperialist ambition, his detailed accounts of maps and use of a technical vocabulary which included references to meridians, zeniths, equinoctial lines, and the Jacob's staff, his aggressive assurance, and his identification as a scourge. The similarities between the two plays indicate that Tamburlaine's special appeal lay in his anti-authoritarian attitudes, his aggressiveness, his reliance on experience, and in his ability to justify his conduct as divinely sanctioned.

An examination of scientific activities in the year 1587 reveals several interesting correlatives between the characteristics of Tamburlaine and attitudes fostered by the practical mathematicians and astrologers. During that year, Englishmen were preparing for an imminent Spanish invasion, and after 1588, England was to become Europe's dominant maritime nation. But her new status was not fortuitous. The period immediately preceding the Armada witnessed widespread efforts to improve England's economic standing through overseas exploration, and included undeclared war with Spain. The shape of Elizabeth's economic and foreign policy led inevitably to both the

Armada and England's success as a maritime nation. Thus, the economic and social conditions resulting in the Armada were a feature of Elizabethan England both before and after the decisive defeat of the Spanish. These advances would have been impossible without extensive cooperation between government policymakers, courtiers possessed of the necessary capital investment, merchants eager for profit, and mathematicians capable of improving England's level of navigational expertise. The mathematicians contributed to rapid technical advances, which in turn made possible economic and social improvements. In addition to fostering a general optimism about the future, scientific activity undercut the acceptance of traditional learning. While they relied on Platonism for much of their initial theoretical assumptions, the practical mathematicians were critical of a slavish reliance on ancient learning, particularly of Aristotle. They tended, therefore, to be critical of the Universities, and to urge a reliance on experimentation and observation rather than on unquestioned acceptance of ideas received from either Plato or Aristotle. In addition, the practical mathematicians boasted of the special commodity that obtained from a working knowledge of mathematics. They argued that mathematical knowledge would bring the practitioner wealth and recognition, while at the same time offering the assurance that such inquiry into natural law was divinely sanctioned. These features of the new science--a close relationship with those portions of Elizabethan society interested in overseas expansion, an anti-authoritarian attitude, a reliance on experiment and observation as a test of received theories, the emphasis on personal profit, and the assurance that scientific inquiry was

divinely sanctioned--suggest an important correlation between the character Marlowe depicts and the social impact of science.

But the practical mathematicians were not alone in the use of mensuration and observation to elucidate natural law. While we now consider astrology a pseudo-science, it can best be characterized as a sister science to astronomy during the Elizabethan period. The astrologers of the period were equally confident of Platonist doctrine, and as excited by astronomical discoveries as their fellow practitioners in the navigational sciences. The period under examination witnessed the astrologers applying these ideas to new purpose. While they had generally confined their predictions to a specific disruption--the correlation between an eclipse and a crop failure, for instance--they now began to elide astrology with the predictions that the world would soon end. These doomsday predictions were particularly Protestant in character, since they depended upon the Reformation interpretation of the Biblical prophecies of the Second Coming. Arguing that the anti-Christ had already appeared in the figure of the Pope, the astrologers assumed their ability to interpret natural signs gave them the power to determine when God would fulfill His plans for the Second Coming. The astrologers placed more stress on the concept of providential design than did their counterparts in the practical sciences, and Tamburlaine's description of himself as under the influence of beneficent natal stars, and his assertion that he is a scourge or divine instrument, suggest that this branch of Elizabethan science contributed to the configurations of Tamburlaine's character. The specific importance of the scientific sector to an understanding of the dramatic tension in Tamburlaine will

be examined in the next chapter. To better understand the scientific contexts themselves, it is first necessary to examine in some detail the state of Elizabethan science in the year 1587.

I

If Marlowe's heroic figure touched a responsive chord in his audience, it might have been because they saw much of themselves in his presentation of the aspiring hero. English society under Elizabeth was in a state of flux and opportunities for what our sociologists call upward mobility were increasingly available to the lesser gentry, merchant, and yeoman classes. Elizabeth, of course, contributed to this charged atmosphere. During her reign the court expanded its influence and her courtiers were able and eager to offer opportunities for advancement through a complex and evidently systematic process of patronage.⁵ Elizabeth's favorites--Raleigh, Burghley, Walsingham, and Leicester--used their position at court to promote a wide variety of schemes which involved shipbuilding, navigation, surveying, architecture, and the need for private investment. Nor were such plans restricted to the nobility. The wealthier middle class was engaged in the exploitation of natural resources, such as the draining of marshes to create arable land or the sinking of new mines;⁶ and in promoting large scale commercial expansion, as is evidenced by the increase in the number of

joint-stock companies underwriting commercial trading ventures.⁷

Such schemes needed for their success not only the burgeoning wealth available for capital investment, but a new technic based upon the mathematical sciences. The desire to create a class of technicians and engineers trained in mathematics and geometry was expressed among the nobility early in the sixteenth century⁸ and it is at this time that a number of mathematicians, notably Dr. Recorde and Leonard Digges, began to publish in English. In her account of the appearance of these books, E. G. R. Taylor observes:

Many people must already have begun asking the question: why should we English have to employ an Italian engineer to build our fortresses? Or, why must we engage a Spanish, or a Portugese, or a French pilot to take our ships across the ocean? Or again, why should we have to buy our marine charts in Lisbon, our globes and maps in the Low Countries?⁹

The answer to these questions was that "the foreigners knew how to apply geometry to mensuration, they could read mathematical tables, they could construct and handle mathematical instruments"; the English did not have these skills (Taylor, Regiment, p. XV). As late as 1582, Edward Worsop laments in his A Discovery of Sundrie Errours . . . Committed by Landemeaters the lack of training in mathematics and geometry among the practitioners of the technical trades. In European countries, he observes, crowned heads consult professional mathematicians on matters of architecture, surveying, mensuration, navigation, and the like, and the major European cities employ mathematicians for similar purposes. But in England, such professional consultants are lacking. Indeed, the artisan classes regard mathematicians with suspicion, since they associate them with practitioners of the black arts (Worsop, sigs.

G-G^V). By 1594, however, the general disrespect for mathematicians had been overcome and the shortage of trained technicians alleviated, at least in the navigational fields. John Davis, in his Seaman's Secrets, declares confidently: "the English goeth before al others in the practises of sayling."¹⁰ This advantage derives, he says, from the English superiority in applying the theoretical aspects of geometry and mathematics to navigation:

I am fully perswaded that our Countrie is not inferiour to any for men of rare knowledge, singular explication, and exquisite execution of Artes Mathematicke. . . . and for the mechanall practises drawn from the Artes of Mathematicke, our Country doth yeelde men of principal excellencie.

(Davis, pp. 134-35)

John Davis, as one of Elizabeth's principle navigators, was well able to evaluate the state of the technical arts in England. His observations testify to the rapid development of a technical class in England during the half century that separated the publication of Robert Recorde's and Leonard Digges' mathematical textbooks (early 1550s) from the appearance in 1594 of Davis's Seaman's Secrets.¹¹ The young men who entered the mathematical professions and technical trades during this period evidently saw the opportunity for personal profit, advancement, and service offered by the exploitative schemes of courtiers, merchants, and private investors. And although the Universities provided the training necessary for some of these professions, notably theoretical mathematics and astronomy, their curricula were not intended to train men to answer the increased demand for navigators, architects, shipbuilders and designers, surveyors, chartmakers, glass grinders, instrument makers, assayers, and engineers

capable of designing dams, mines, canals, and drainage systems. For the basic information necessary to these skills the prospective student turned to manuals printed in the vernacular. The printing presses of London were also the source of information on geography, geometry, and navigation much in demand by the generation of young men who, fired with the exploits of Sir Francis Drake and the astounding defeat of the Spanish Armada, set out to sea in the late 1580s and 90s with hopes of returning in ships whose holds were full of booty captured from the Spanish or bartered from the natives of Cathay or the Americas.¹²

The audience at the first performance of Tamburlaine undoubtedly included many such ambitious young men, who were to seize the opportunities for advancement available to those skilled in the practical applications of the mathematical sciences. If any one of these young men had stopped while on the way to the theatre at some of the London book stalls, he would have encountered a number of technical and mathematical texts appealing no less directly than Marlowe to the desire for self-aggrandizement. Between the years 1570 and 1630, publication of such works kept pace with the appearance of books dealing with history, government, and politics. Technical manuals and mathematical texts were numerically overshadowed only by books dealing with religion and toward the close of the sixteenth century, works of purely literary significance. During this period, scientific books in the vernacular were more numerous in England than in any other European nation with the exception of Italy.¹³

These books introduce the reader to the basic tenets of the New Science and they characteristically promote new ideas over old. A sense

of opportunity is set against the conservative desire for stability; an empirical approach to studying nature is touted above the scholastic acceptance of authority; new discoveries and inventions are presented which challenge accepted verities; and a new application of Pythagorean-Platonism is favorable juxtaposed to the moribund reliance on Aristotle. The books were directed to both gentleman and commoner, and considering the formidable combination of a sound introduction to mathematics and the promise of opportunity held out to anyone literate enough to comprehend the lessons, it is small wonder they stimulated the study of mathematics, and that most of them remained in print for many decades.

One of the books which might have come to the attention of someone seeking to further his practical education especially in navigation is Robert Norman's The New Attractive (1585), which presents Norman's discovery of the magnetic dip. So important was this book for navigators and seamen that it went through several editions after its first appearance in 1581. It was reprinted in 1585, 1596, and 1614, was listed in William London's Catalogue of Most Vendible Books (1657), and remained a standard work until the eighteenth century.¹⁴ Norman's "Epistle Dedicatory" to William Borough, Comptroller of her Majesty's Navy, includes many of the features characteristic of similar works. He emphasizes his lack of University training, while stressing that his experimental method gives him an advantage over those who rely too heavily on authority:

So I . . . (being myself an unlearned Mechanicien) by occasion of my profession, making sundrie experiments on the Magnes stone, found at length amongst many other effects, this straunge new propertie of Declining of the Needle, which forgetting, or rather neglecting mine owne

nakednesse and want of furniture to set forth the matter,
I have heere in simple sort proposed, and published to
the view of the world.

(Norman, sig. A. iii)

While showing his respect for the ancient authors who have discussed the lodestone, Norman says it is his intention to present "a late experimented truth found in this stone, contrarie to the opinions of all them that have heretofore written thereof" (Norman, sig. A. iii). Norman takes time to comment on the intense personal joy derived from scientific inquiry, as well as the sense that such inquiry is God's work and serves the commonwealth:

So that we see these men and sundrie others that are mentioned in authors being carried & overcome with the incredible delight conceived of their owne devices and inventions, though they follow partly the contentation of their private fancies, yet they seem chiefly to respect either the glory of God, or the furtherance of some publicke commoditie. Whose good example in this behalfe I will endeavor to follow. . . .

(Norman, sig. Aii-Aii^V)

The scientists whom Norman mentions as transported by their discoveries are Pythagoras and Archimedes, and by mentioning them, Norman introduces his readers to two of the most important predecessors of the new mathematics, and implicitly signals the anti-Aristotelian nature of recent scientific inquiry. His entire preface is a gentle dismissal of the older methods of scholasticism and an enthusiastic promotion of experimentation. He tells the reader that one reason for his publication is "to give occasion to industrious and skilful travailers by sea and by land, to make diligent observations of these effects in sundrie places, whereby some generall conclusion may be inferred" (Norman, sig. Aii^V).

Finally, Norman sings the praises of his profession and directs the reader to the vernacular texts which explain the mathematical skills necessary to all technicians:

there are in this land diverse mechaniciens, that in their several faculties and professions, have the use of those arts [mathematics] at their fingers end, and can apply them at their severall purposes, as effectuellie, and more readilie, than those that would most condemne them. For albeit they have not the use of the Greek and Latine tongues, to search the varietie of authors in those artes, yet have they in English for Geometrie, Euclides Elements, with absolute demonstrations, and for Arithmetike, Records workes, both his first and second part: and diverse others, both in English, and in other vulgar languages, that have also been written on them, which bookes are sufficient to ye industrious Mechanician, to make him perfect and readie in those sciences, but especiallie to apply the same to the arte or facultie which he chieflie professeth.

(Norman, [sig. A-iiii])

The reader who came to The New Attractive seeking information about navigation was introduced briefly to the most important features of the New Science. He was reminded that Pythagoras and Archimedes, rather than Aristotle, were the great precursors of contemporary mathematics; he learned that the experimental method, rather than scholastic disputation, was basic to scientific inquiry; he was invited to join the growing numbers of skilled technicians who were essential to the development of navigation; he was told of the great personal satisfaction, as well as the sense of service to God and country which came with scientific discovery; and he was directed to important vernacular works which would help him enter this new and promising vocation.

Authors of similar works featured at least some of these elements in their prefaces. John Blagrove, in his Mathematical Jewell (1585),

introduces the reader not only to his elaborate astrolabe, but to the joys and profit deriving from the practice of the technical arts. His book is addressed to "Gentlemen and others desirous of speculative knowledge" and speaks of his wish to open the secrets of mathematics "unto everie ingenious practiser . . . whence many inventions yet unthought of may spring from the common sort of handicraftman and workman."¹⁵ The desire to promote such knowledge among the "common sort" similarly prompted William Bourne to publish A Regiment for the Sea (1574).¹⁶ This book, intended for the unskilled sailor, went through five editions between 1576 and 1696. Even greater success was enjoyed by Richard Eden's The Arte of Navigation,¹⁷ a translation of a work by the Spanish navigator Martin Cortes. Eden's work, which he dedicated to the Muscovy Company, provides a mathematical approach to nautical science and was reprinted five times between 1561 and 1589; it was enlarged in 1596, and reprinted three times between 1609 and 1615. In addition to indicating the importance of mathematics to the practice of navigation, the work introduces the reader to the theories of the earth's motion, if only to refute them.

Should the importance of mathematics to the technical professions be missed by those who were not interested in pursuing a nautical career, the lesson was brought home in books dealing with other fields of technical science as well. A young gentleman of property browsing in the bookstalls might well have been interested in the recent books on surveying. The increase in land sales occasioned by the scramble of wealthy merchants, lawyers, and yeoman into the gentry had obviated the need for professional surveyors. The inadequacies of surveying quickly

became evident, and many landowners were involved in litigations as a result.¹⁸ Edward Worsop's A Discoverie of Sundrie Errours . . . daily committed by Landemeaters, ignorant of Arithmetike and Geometrie (1582) was written for the expressed purpose of protecting its middle class readers from land frauds, and to argue that "none ought to be admitted to that function [surveying], but the learned practitioners of those sciences" (Worsop, title page).

Worsop, like Blagrove and Bourne, sees his role as that of a conduit between the learned practitioners of mathematics and the "common sort." In his preface, he is eager to remind his readers of the excellent books available on mathematics in the vernacular:

Sundrie learned works of the Mathematical (for such as understand or affect learning) are extant in our vulgar tongue: as Euclide, the works of Doctor Record, of Master Leonard Digges, of Master Thomas Digges, and some others. But because these learned bookes cannot be understoode of the common sort . . . I have thought good by a plaine and popular discourse, to laie open unto the understanding of every reasonable man, the necessities and the commodities of those singular workes and knowledges.

(Worsop, sig. A.ii^v)

Although Worsop here makes vernacular works on mathematics sound too difficult for his readers, he argues quite differently in the text. His book consists of a conversation between two friends and himself. At one point, his friend Johnson says he fears he is too thick-headed to understand Euclide's Elements, a work which Worsop has declared is essential to the mastery of surveying. Worsop answers his friend: "Everie sensible man that will studye Euclides elementes, and give himselfe to practice, may with as great ease understand the Mathematics, as any of the other sciences liberal" (Worsop, sig. G. ii). He observes

that geometry is important to the study of geography, navigation, martial exploits, surveying, measuring of solids, architecture, the construction of engines, draining or raising water, indeed, to all the professions necessary for a healthy, commercial economy (sig. G.ii^v). He urges his friend to apply himself, and if he needs any more encouragement, Worsop refers him to John Dee's "Preface" to Billingsley's important translation of Euclide. Dee's "Preface," as we shall see, carefully explains the usefulness of mathematics to all professions, and Worsop insists "it is a work of such singularitie and necesitie to Students of the Mathematics, that I wish them to make it a manuel" (Worsop, sig. G. iii^v).

If Worsop's work emphasizes, for his middle class readers the practical applications of mathematical knowledge, Thomas Digges's earlier treatise on surveying and ballistics introduces the gentleman reader to some of the more startling developments in scientific inquiry, as well as to more complicated geometrical demonstrations. Thomas Digges, who was the son of the famous mathematician Leonard Digges, published posthumously his father's work, A Geometrical Practise, named Pantometria (1571; 1591),¹⁹ to which he attached his own treatise on the five Platonic solids. In his address to the reader, Digges turns his attention to the ignorant who do not understand the personal profit and contribution to the commonweal that obtains from an understanding of the mathematical sciences. He lists the various fields to which geometry might be applied, including physics, meteorology, astronomy, music, perspective, cosmography, architecture, and surveying (Digges, sig. A. ii-A. ii^v). He concludes with a specific address to the gentleman

reader: "there is no kinde of man, of what degree or vocation so ever he be, that shall finde matter bothe to exercise him selfe, so surely for a Gentleman especially that professeth the warres (Digges, sig. A. ii^v).

Digges gives a catalogue of great generals who rose or fell by their mathematical skills, mentioning particularly Alexander, Hannibal, and Cyrus. If this appeal to martial glory is not sufficient to arouse an interest in mathematics, Digges piques the reader's curiosity with a description of the wonders to be derived from a use of perspective glasses. He mentions first Archimedes' use of a perspective glass to set the Roman navy afire at Syracuse. Then he gives a more immediate application of the skill:

my father by his continuall paynfull practices, assisted with demonstrations Mathematicall, was able and sundrie times hath by proportionall glasses duely situate in convenient angles, not only discovered things farre off, reade letters, numbred pieces of money with the very coin and superscription thereof, cast by some of his friends of purpose uppon Downes in open fields, but also seven myles off declared what hath been doon at that instante in private places: He hath also sundrie times by the Sunne beames fired Powder, and dischargde Ordinaunce halfe a myle and more distaunt. . . .

(Digges, sig. A. iii^v)

After this astonishing description, Digges tells the reader that his father had often declared he owed his skill in these matters to the practice of geometry, and concludes with a reminder of the personal benefits to be derived from similar pursuits: "thus have I partely declared the pleasure and commoditie that any well disposed mind may reape by these three bookes of my fathers" (Digges, sig. A. iii^v).

Thomas Digges' enthusiasm for his subject, as well as his familiarity with intriguing new discoveries and devices made him an excellent salesman for the New Science, as well as one of his country's pre-eminent mathematicians. He demonstrated these skills again when, in 1576, he appended to a reissue of Leonard Digges's Prognostication Everlastinge a treatise entitled "A Perfit Description of the Caelestiall Orbes, according to the most ancient doctrine of the Pythagoreans, latelye revived by Copernicus and by Geometrical Demonstrations Approved." A Prognostication Everlastinge is the sort of almanac which enjoyed wide circulation during the period, and by attaching this first English translation of Copernicus to the Prognostication, Thomas Digges assured himself a wide audience. The Prognostication was reprinted at least six times between 1576 and 1605. For each edition, the volume was completely reprinted; that is, the publishers did not reissue old sheets with a new title page.²⁰

In his address to the reader, Thomas Digges bases his arguments favoring the Copernican theory on premises generally adopted by advocates of the New Science. He disparages the over-reliance on authority and argues that enlightened thinkers in his own time have corrected many errors present in ancient authors:

Having of late (gentle reader) corrected and reformed sondry faultes that by negligence in printing have crept into my fathers Generall Prognostication: Among other thinges I found a description or Modill of the world and situation of Spheres Coelestiall and Elementare according to the doctiren of Ptoleme, whereunto all Universities (ledde thereto chiefly by the authority of Aristotle) sithens have consented. But in our age or rare witte (seeing the Continuall errors that from time to time more and more have been discovered, besides the infinite

absurdities of their Theorickes, which they have been forced to admit that would not confesse any mobilitie in the ball of the earth) hath by long studie, painfull practise, and rare invention delivered a new theorick or model of the world, shewing that the Earth resteth not in the Center of the whole world, but only in the center of this our mortall world or Globe of Elementes which environed and enclosed in the Moones Orbe, ande together with the whole Globe of Mortalitie is caried yearly rounde about the sunne.

(Digges, "Perfit Description," p. 79)

Against the slavish adherence to authority practiced by University dons, Digges places the new scientific methodology, based on mathematical demonstration. It is mathematical proof, not the evidence of the senses, argues Digges, which should be the foundation for our inquiry into the natural world: "So many wayes is the sense of mortall men abused, but reason and deepe discourse of witte having opened these things to Copernicus, and the same being with demonstrations Mathematicall most apparently by him to the world delivered" (Digges, "Perfit Description," p. 79). Recognizing that his reader might not understand the importance of relying more on mathematical proof than on the evidence of the senses, Digges returns to his attack on the scholastic procedures of the Universities and offers in their place a sounder method of investigation:

Why shall we so much dote in the apparance of our senses, which many ways may be abused, and not suffer ourselves to be directed by the rule of Reason, which the greate GOD hath given us as a Lampe to lighten the darknes of our understandinge and the perfite guide to leade us to the golden braunche of the Veritie amide the forrest of errors.

Behold a noble question to be of the Philosophers and Mathematicians of our Universities argued not with childish Invectives but with grave reasons Philosophicall and irreproveable Demonstrations Mathematicall.

(Digges, "Perfit Description," p. 80)

Arguing, as would Norman and others, that scientific inquiry is God's handiwork, Digges points to the scholastic method of disputation and an over-reliance on authority as roadblocks to this noble work. It is evident from his line of argument that Digges is addressing his remarks to the beneficiaries of an English humanist education, and undoubtedly wishes to appeal as he did in the Pantometria to the literate and learned (though not necessarily scholarly) gentleman reader. Indeed, he compliments such a reader directly when he says that he is publishing his treatise "to the ende such noble English minds (as delight to reach above the baser sort of men) might not be altogether defrauded of so noble a part of Philosophy" (Digges, "Perfit Description," p. 79).

Digges' "Perfit Description" presents his readers with startling new theories and introduces them to the New Science. Moreover, he introduces them to a radically altered picture of their world in such a way as to reassure them that they are perfectly capable of understanding and absorbing this new information. Finally, he argues that mathematical inquiry into natural law is a sign of man's cooperation with God, and invites his readers to acquire the skills necessary for appreciating this new method.

If Digges implicitly directed the interested reader to basic vernacular texts on mathematics, other technical manuals did so explicitly, as we have seen. The authors of mathematical texts most frequently mentioned are Leonard Digges, Dr. Robert Recorde, Sir Henry Billingsley, and Dr. John Dee. Recorde wrote three mathematical texts, each one building on the skills taught in the previous work. His Grounde of Arts (1543) was the first important work in English on arithmetic,

and it remained a standard work until after the Restoration, going through twenty-six editions between 1540 and 1662.²¹ The second book in the series, The Pathway to Knowledge, appeared in 1551. It was the first geometry published in English, and Recorde assumed that his readers had a basic knowledge of arithmetic. This book was followed by The Castle of Knowledge (1556), which introduced the student to cosmography. It was reprinted for over half a century. A new edition was printed as late as 1596, and a copy was included in Frobisher's ship library on his first voyage.²² On the whole, Recorde's works provided a firm foundation in mathematics for those interested in entering the new technical fields.²³ Recorde was a Platonist who taught his readers the Pythagorean-Platonic concept that the key to the secret of the universe may be found in mathematics.²⁴ The available evidence indicates he was a Copernican, and in The Castle of Knowledge he briefly mentions the Copernican theory.²⁵

Although Recorde's work is a landmark in the emergence of vernacular texts on the sciences, and although he alerts his reader to important theoretical aspects of cosmography, his primary interest in astronomy is not its practical applications. In his Preface to The Castle of Knowledge, he discusses the importance of astronomy to agriculture, accurate time-keeping, and medicine, but the bulk of his essay is devoted to comments on the importance of astronomy to judicial astrology. Recorde feels that judicial astrology, because it helps the adept better understand God's design for man, is the most important application of astronomy, and the overriding tone of his essay is religious. Recorde ends his Preface by calling upon his readers to

lift up their eyes to heaven:

beholde the good guiftes of God: Note diligently their
meruailous motions, and studiouslye considre their
wondrefull alterations, with perpetuall constancye in
inuioleable ordre: so shall men neuer bee doubtful of
Goddess prouidence towarde them, of his daylye prouision
for them, when they see that he hath made such an
unexplicable frame to serue onely for mannes uses.
. . . In token therefore of thankfulness, let vs singe
an Hymne unto that God, praisinge his name, and
magnifynge him foreuer and euer.²⁶

Recorde concludes his essay with a hymn. The reader is assured by the tone of the essay and by its conclusion that the most important feature of astronomy is that it allows a greater appreciation of God's work.

It is perhaps a token of the changing appreciation of the practical advantages which derive from the mathematical sciences that John Dee's Preface to Sir Henry Billingsley's translation of Euclide's Elements (1570; 1651) is much less concerned with the magico-religious applications of mathematics than it is with outlining for the reader the many vocational opportunities available to those who are knowledgeable in arithmetic and geometry. John Dee was recognized as the pre-eminent mathematician of his day, and his work on the Euclide certainly added to its prestige and chances of success. Dee, even more than Recorde and Digges, is eager to interest the young, educated gentleman in mathematical studies. To achieve this, he approaches his reader in three ways: he appeals to the reader's self-interest, national pride, and desire to serve God; he carefully outlines the variety of vocational opportunities available to those knowledgeable of mathematics; and he explains that the Platonist epistemology combined with the experimental

method makes the acquisition of the necessary basic skills easy and pleasurable.

Dee's direct appeal to the educated young gentleman is manifest throughout the preface, but it is most explicit when he explains why Euclide is being published in the vernacular. Dee is aware that such a publication encroaches into territories traditionally claimed by the Universities, but he explains that Oxford and Cambridge will not suffer in reputation if their scholars read mathematics in the vernacular because the attainments of any scholar reflects well on his alma mater. Moreover, the Italian, French, Dutch, Spanish, and Portuguese universities have their students read classical mathematics in the vernacular, and this has not adversely affected their reputations. In fact, argues Dee, the presence of such books in England will eventually prove beneficial to the universities, since the "common or vulgar scholar" can now be introduced to mathematics before he goes to college; and other unlatined students, seeing for the first time the treasures available in Latin texts, may be more strongly motivated to seek a classical education at the University (Dee, sig. A. iii^V-A. iiiii).

Although he endeavors to assuage the Universities, Dee is clearly aware that the opportunities he describes might well divert many young men from matriculation. He says as much when he comments that young intelligent gentlemen, who never intended to go to university, can now learn skills which will contribute to the growth and prosperity of the nation. That the Euclide represents a potential threat to enrollments at the Universities is implicit throughout Dee's preface since, as we shall see, he juxtaposes the experimental method of the New Science

against the authority bound, scholastic methods of the Universities.

Dee assumes his reader is ignorant of mathematics and unaware of the many opportunities available to those who study it. Testimony to Dee's conception of his audience is given in the opening of his preface, which begins, significantly enough for such a work, with the words "Divine Plato." The immediate reference is to the anecdote about a group of curious students who came to listen to Plato teach. After listening for a short while, they went away disappointed in Plato because they could not understand a word he said. Dee offers Aristotle's explanation of the incident: the disappointed listeners had come with no background or context for understanding Plato. Dee says he is in much the same position as Plato because he knows his readers have little background in mathematics, and he is faced with the perplexing problem of how to explain to them the usefulness of Euclide. Therefore, he will try to give the background necessary to understanding the value of mathematical science. As he elaborates on his role, he makes a shrewd appeal to his reader's self-interest, ambition, and pride. He says he writes to those who will

use their utward [outward] senses, to the Glory of God,
the benefite of their Country and their own secret
contentation, or honest preferment, on this earthly
Scaffold. To them, I will orderley recite, describe,
& declare a great number of Artes, from our two
Mathematical fountaines [arithmetic and geometry],
derived unto the heldes of Nature. Whereby, such Sedes
and Rotes, as lye depe hyd in the ground of Nature
are refreshed, quickened, and provoked to grow, shote
up, floure, and give frute, infinite, and incredible.

(Dee, sig. a. iii)

Dee unashamedly appeals to the reader's desire to serve God,
country, and self while offering the study of mathematics as the best

means to these ends. Moreover, he acknowledges that self-interest is not the least important of these goals:

Perchaunce you looked for, (long ere now) to have had some particular prooffe, or evident testimony of the use, proffit and commodity of Arithmetike vulgar, in the common lyfe and trade of men. Thereto, then, I will now frame myself: But herein great care I have, least length of sundry profes, might make you deeme, that I either did misdoubt your zelous minde to vertues schole: or else mistrust your able witts, by some, to gesse much more. A profe then, foure, five, or six, such, will I bryng, as any reasonable man, therewith may be persuaded, to love and honor, yea learn and exercise the excellent science of Arithmetic.

(Dee, sig. *ii)

Dee's use of the word "commodity" in this context is particularly interesting. He clearly intends it to mean an "advantage, benefit, profit, or interest," especially in the sense of "private or selfish interest." This use of the word became current about the time of Dee's writing; previously it had been used to refer to fortunate occurrences or opportunities (1551) or to describe the relative usefulness of an object or product (c. 1400).²⁷ Dee means it to be synonymous with "proffit" and uses it in this sense to reinforce his appeal to young and ambitious readers. He is confident that his readers are quick witted enough to perceive instantly the many self-serving uses to which arithmetic may be put, and he therefore mentions only a few of the trades and professions which rely on arithmetic: merchants, money changers, physicians, and the military (Dee, sig. *iii).

Dee is less sure, however, of his reader's ability to appreciate the usefulness of geometry and a major portion of his essay is devoted to cataloguing and explaining the many "artes" as he calls them which derive from it. To make his explanations clearer, Dee divides

mathematical practitioners into two types: the mechanicien and the archmaster. We would consider the mechanicien a technical engineer or someone working in applied science, while the archmaster would bear some resemblance to the theoretician of mathematics.²⁸ Part of Dee's essay refers to the mechaniciens "or mechanicall workman . . . whose skill it is, without knowledge of Mathematicall demonstration, perfectly to work and finishe any sensible worke, by the Mathematicien principall or derivative, demonstrated as demonstrable" (Dee, sig. a. iii). Dee envisions a close cooperation between the master of mathematics and the technician who applies his ideas. The master mathematician, for instance, would assume responsibility for the physical theories underlying the design of an instrument such as an astrolabe; the technician for its design and execution. Because Dee concentrates on how geometry may be used to improve England's technology, his appeal, while addressed primarily to the educated gentleman, is extended to the beneficiaries of a grammar school education as well. His plans embrace a broad spectrum of Elizabethan society, and he thus anticipates the cooperation between social classes which made possible the emergence of England's technology.

Dee's desire to promote such cooperation explains his detailed cataloguing of the practical applications derived from each branch of geometry. He tells his reader that his careful detailing of these vocational opportunities is intended to dispel the popular misconception that geometry is useful only to carpenters, clock-makers, and similar artisans (Dee, sig. b. i). His efforts to clarify this common mistake result in his giving etymologies of the terms used to describe the specialized areas of study, and he offers parenthetical remarks about

the "state of the art" in each field, lamenting the lack of trained men able to apply geometry in a practical way. He comments, for example, on the untrustworthiness of surveying techniques as they are practiced by the untrained, and observes wistfully that the loss of true land value created by these faulty practices would endow forever one mathematical chair--like the two at the University of Paris--for both English universities (Dee, sig. a. iiii).

Dee begins his catalogue with those technical professions whose dependence on geometry is obvious: chart-making, mensuration, ballistics, and military strategy. He moves to more arcane applications, beginning with the art of perspective or optics. Like Thomas Digges he is both enthusiastic about the possible uses of perspective glasses and more anxious to titillate the curiosity of the reader than to provide him with solid information. He mentions the importance of optics to the fields of astronomy and astrology, then forbears revealing any more for fear of putting too much information into the heads of the ignorant (Dee, sig. b. 1^v).

Fortunately for his reader, Dee is willing to explain more fully the applicability of geometry to other technical fields. Some of the applications are so novel Dee coins names for them; for instance, he uses the word *anthropographie* to signify "the description of the Number, Measure, Waight, figure, Situation, and colour of every diverse thing, conteyned in the perfect body of MAN" (Dee, sig. c. iiii). The word *hypogeiocie* is evidently another coinage by which Dee signifies the work of engineers who design mines (Dee, sig. d. i^v).

Other technical sciences include Trochilike (study of circular motion), which is applied in the design and construction of mills; Helicosophie (study of the spiral), which is useful in designing machinery and buildings; Pnematithmie (geometrical measurement of the four elements), which might be used to design a diving bell "to go to the bottom of the sea without daunger"; Menandrie (the mechanics of weight lifting), which allows the practitioner to design cranes, levers, the catapult and other military hardware; Hydrogogie (measurement of falling water), a knowledge essential to the designing of canals; Horometrie (measurement of time), a skill essential to the construction of the navigational dial; Zographie (commonly called painting), a skill useful to the goldsmith and illustrators of herbals; Architecture, which despite popular opinion and practice, should rely heavily on the lessons gleaned from geometry; Navigation, and finally Thaumaturgike (engine design), which can be applied in the designing of clever and astounding devices whose lifelikeness deceives the viewer. While this last seems a whimsical application of geometry, Dee's interest in constructing such devices was one of the activities which resulted in his being labeled a necromancer. Chaffing from this and other insults, Dee digresses to attack those who are ignorant of his work (Dee, sigs. c. iii^v-A. i^v; A. i^v-A. iii).

After reassuring his reader by his own lengthy defense that geometry is not connected with the black arts, and having introduced the reader to the many opportunities available in technical professions to those knowledgeable of geometry, Dee explains the role of the pure mathematician, the student of Archmastrie:

This Arte, teacheth to bryng to actuall experience sensible, all worthy conclusions by all the Artes Mathematicall purposed, & by true Naturall Philosophie concluded: & both addeth to them a furder scope, in the termes of the same Artes, & also by this propre Method, and in peculier termes, procedeth, with helpe of the foresaid Artes, to the performance of complet Experiences, which of no particular Art, are hable, (Formally) to be challenged.

(Dee, sig. A. iii^v)

In short, the Archmaster uncovers the secrets of nature and follows the quickest route to comprehending reality.²⁹ He does this not through argument, persuasions, and discourse but through experiment and observation, because "Wordes, and Argumentes, are no sensible certifying: not the full and finall frute of Sciences practicable" (Dee, sig. A. iii^v). The major area of study to which the Archmaster applies himself is optics:

But the chief Science, of the Archmaster, (in this world) as yet knowen is an other (as it were) OPTICAL Science, whereof, the name shall be told (God willyng) when I shall have some (more just) occasion, thereof, to Discourse.

(Dee, sig. A. iii^v)

Dee thus ends his tour of the land of scientific opportunity with a mystery, offering just enough to incite the curious to a study of geometry so that he will be prepared for Dee's future astonishing announcements.

Dee's "Preface" shows him to be a master rhetorician. He intends to arouse, titillate, and inspire his young and eager readers, and plays upon their idealistic desire to serve God and country as well as their interest in preferment and profit. Dee's rhetorical shrewdness is balanced by his sober interest in introducing his readers to the basic premises of the New Science: the Platonist epistemology and the

experimental method. His treatment of these subjects alerts his reader to the skeptical and anti-scholastic complexion of scientific study, and demonstrates the ease with which the new method can be learned.

Dee tells the reader about the theory of number, explaining why the senses cannot be relied upon to provide an adequate key to nature's laws. The general forms of things "are constant, unchangeable, untransformable, and incorruptible. Neither of the sense can they, at any time, be perceived or judged" (Dee, u.n., fol. p. 2). These forms are sempiternal as Boethius has told us: "'All thinges (which from the very first virginall being of thinges, have been framed and made) do appeare to be Framed by the reason of Numbers. For this was principalle example or patterne in the mind of the creator'" (Dee, sig. i). The Platonist cast of Dee's discussion is reinforced by his reference to Pico della Mirandola, whom he quotes as saying, "'By numbers a way is had, to the searching out, and understanding of every thing, hable to be knowen'" (Dee, sig. i^v). Since the reader is urged to read Pico, the seminal importance of Platonism to the study of mathematics should be clear to him. Dee emphasizes Plato's importance throughout the preface. In his discussion of the theory of geometry (which Dee terms Megethologia), Dee observes it was Pythagoras and Plato who gave to geometry a new importance, and says the study of the science lifts "the hart above the heavens, by invisible lines" (Dee, sig. a. ii). He refers the reader to the seventh dialogue of The Republic, and quotes Plato extolling the power of geometry to acquaint the mind with the Divine (Dee, sig. a. i); then he reminds the reader of how much more pertinent such a study is to Christian men than to pagan Greeks:

And for us, Christen men, a thousande thousand mo occasions are, to have need of the helpe of Metathological Contemplations: whereby, to trayne our Imaginations and Myndes, by litle and litle, to forsake and abandon, the grosse and corruptible objectes, of our utward [outward] senses and to apprehend, by sure doctrine demonstrative Things Mathematicall, And by them readily to be holpen and conducted to conceive discourse and conclude such as concerne our Blisse everlastinge: which, otherwise (without speciall priviledge of illumination, or Revelation from heaven) No mortal mans wyt (naturally) is hable to reach unto, or to Compasse.
(Dee, sig. a. iii)

Having emphasized the importance of Platonic thought to the New Science, Dee turns to its adjunct, the experimental method. In his discussion of "statike" or the study of weight and motion, he provides a number of principles Archimedes derived from his experiments on hydrostatics, and observes: "By these verities great Errors may be reformed, in opinion of the natural motion, of things, Light and Heavy, which errors are in Naturall Philosophie (almost) of all men allowed: to much trusting to Authority: and false Suppositions" (Dee, sig. c. i).

To illustrate further how important is the experimental method to giving a true picture of nature, Dee mentions the experiments of John Baptist de Benedictus by which he disproved the notion that a heavy solid will fall more quickly than a light one. Dee then provides a lengthy description of practical experiments which the reader himself can conduct in order to deduce the relative proportions of a cube and a sphere. He urges the reader to try these experiments using spheres and cubes made of different materials and in a variety of sizes until he has "made a perfect universall Experience of it" (Dee, sig. c. i^v). By so doing, Dee assures the reader, he can with little effort follow the footsteps of Archimedes:

When you have found this one certaine Drop of Naturall Veritie, procede on, to Inferre, and duely to make assay, of matter depending. . . . And So are we fallen into the knowledge sensible and Experimental of Archimedes great secret: of him, by great travaile of minde, sought and found.

(Dee, sig. c. i^v)

Dee's description of the ease with which the experimental method can be practiced was surely intended to inspire confidence in the reader, and Dee does not lose an opportunity to appeal once again to the reader's desire for profit and gain. As an example of the practical application of the theories of proportion, Dee explains that such knowledge allows a designer to build a scale model of a ship and to project the full dimensions of it before the keel is laid. Such ability will put the savant much in demand: "Thus in sundry waies you may furnishe your selfe with such straunge and profitable matter; which long hath been wished for. And though it be Naturally done, and Mechanically: yet hath it a good demonstration Mathematical" (Dee, sig. c. iii).

By thus praising the experimental method, Dee convinces his reader of the ease with which the technical professions may be entered, and of the immediate benefits which the technical practitioner can expect. It is easy to see why Dee's "Mathematical Preface" served as the prototype for later writers. The prefaces of Norman, Worsop, and Blagrove repeat many of Dee's examples, and at times echo his language; and considering the care he exercises in introducing his readers to the basic scientific premises and categories, it is not surprising that many authors of technical manuals referred their readers to Dee. The "Preface" enjoyed considerable influence well into the seventeenth century. In his dedication addressed to the Earl of Leicester in his

Almanack for 1575, Dr. Richard Forster declared that the rebirth of mathematics in England "was due to that most able of English mathematicians, John Dee, maintainer of the new Hypothesis."³⁰

Similarly, Thomas Fale praises Recorde and Dee as the country's pre-eminent mathematicians in his Horologiographia: The Art of Dialling (1594; rpt. 1626, 1627, 1633, 1652).³¹ In 1654, John Webster quoted the "Preface" in his Academiarum Examen as part of his argument for training chemists.³² And in 1655, Samuel Hartlib quoted Dee's "Preface" with approval in private correspondence.³³

The rapid growth of the technical professions between the 1550s and the 1590s is silent testimony to the numerous less distinguished readers of Dee. Robert Norman is an example of one of these. He began as a seaman and educated himself through a careful reading of mathematical texts in the vernacular. His study led to his discovery of the magnetic dip and publication of The New Attractive, the preface of which includes Norman's praise of the Euclide. Although Dee's concentration on the methods of the New Science, coupled with his catalogue of the professions dependent on geometry, contributed importantly to the influence of both his preface and the translation, his ability to suggest rhetorically the unlimited opportunities afforded by the New Science cannot be overlooked when assessing his appeal to the young and restless generations of the eighties and nineties. He disparages the conservatives who would like to keep the traditional methods of study with all the limitations they imply:

Well, I am nothing affrayde of the disdayne of some such,
as thinke Sciences and Artes to be but Seven. Perhaps,
those Such, may with ignorance, and shame enough, come

short of them Seven also; and yet nevertheless they cannot prescribe a certaine number of Artes: and in eche, certaine unpassable boundes, to God, Nature, and Mans Industrie. New Artes, daily rise up: and there was no such order taken, that, all Artes, should in one age, or in one land, or of one man, be made knowen to all the world. Let us embrace the Giftes of God, and wayes of wisdom, in this time of Grace, from above, continually bestowed on them, who thankfully will receive them: Ex bonis Omnia Cooperabuntur in bonum.

(Dee, sigs. c. iii-c. iii^v)

With this rhetoric, suggestive of change, expansiveness, a manifest destiny, and unlimited opportunity available to them at the London bookstalls, it is small wonder that the audience of Marlowe's Tamburlaine responded positively to a speech such as this:

Tamb: Our souls, whose faculties can comprehend
The wondrous architecture of the world
And measure every wandering planet's course,
Still climbing after knowledge infinite,
And always moving as the restless spheres
Will us to wear ourselves and never rest,
Until we reach the ripest fruit of all,
That perfect bliss and sole felicity,
The sweet fruition of an earthly crown.

(1 Tamb., II, vii, 21-29)

In Tamburlaine, the young man could see manifest in glittering and exotic spectacle all that Recorde, Digges, and especially Dee had promised. The "sweet fruition of an earthly crown," with its suggestion of riches, power, and authority is linked with the capacity to study and measure the natural world, and with a restless, ambitious drive. Most importantly, Tamburlaine's ruthless self-aggrandizement is rewarded: at the end of the play, his martial prowess gains him an Empire.

While the young gentlemen and commoners of London were reading in Dee of the golden opportunities within their reach, and seeing this promise enacted at the theatre, sober minded courtiers and businessmen

across town were seeking through a variety of means to act out these dreams and visions in fact. That they, too, dreamed of power and empire is testified to by the events which commanded attention in 1587. Davis sailed that year on his third voyage in search of the Northwest Passage; Raleigh dispatched his second group of colonists to Virginia; Cavendish was circumnavigating the globe; and all of England was fortifying coastlines and mustering a navy against a Spanish invasion. The extent of these ventures is surprising considering England's precarious economic status and the paucity of achievements in overseas navigation at the time of Elizabeth's accession. In 1558, Continental governments expected that Elizabethan England would soon totter into bankruptcy,³⁴ while England's traders had established only one trading route as the result of overseas exploration.

The ventures of 1587 reflect the response of government and private investors to the precarious economic status of England at the time of Elizabeth's accession. Underlying these ventures were government policies carefully outlined by Burghley and Walsingham, encouraged by courtiers such as Christopher Hatton, the Earl of Leicester, and Sir Walter Raleigh, and supported by merchant adventurers such as William Sanderson, Thomas Smith, and Sir John Gresham. Motivated by the desire to circumvent Spain's trading monopolies in the Southern hemisphere, these men actively pursued the dream of a northern Passage to Cathay in the hopes of bringing riches to England over a route not claimed by Spain and of establishing a northern empire on the lands discovered in the search. The desire to curtail Spain's maritime dominance altogether resulted in the government issuing Letters of

Marque to privateers, supporting encroachments into Spanish trading routes, and making preparations to defend England against certain retaliation.

Although the aim of retrieving England from her economic straits required single-minded determination from those involved, the effort was primarily a cooperative one. While the policy-makers, courtiers, and businessmen who sponsored these ventures sometimes disagreed on method, they concurred on the primary configurations of the policies, and they all recognized the crucial role to be played by mathematicians in realizing their ambitions. The important mathematicians of the day --Thomas Digges, John Dee, Thomas Hariot, Robert Hues, and Edward Wright --found patrons in those who sponsored these policies, and the contributions made by these mathematicians to the history of science resulted in large part from their involvement in either the tactical problems of the naval war with Spain, or the navigational problems peculiar to the voyages in search of the Passage.³⁵

No mathematician contributed as much to the search for a northerly Passage to Cathay as did John Dee. Nor did anyone better exemplify the maxim he included in the "Preface": Ex bonis Omnia Cooperabuntur in bonum. His participation in the search for the Passage began when he returned to London in 1547 from his studies on the Continent, where he had become acquainted with the most important mathematicians and cartographers and had gained a wide reputation for his own mathematical skills. Dee was introduced to the court of Edward VI at a time when his services were crucial to the economic plans for England. The Duke of Northumberland, as effective head of government,

was anxious to galvanize the allegiance of the commercial classes to the young king. He sought to achieve this by stimulating overseas trade.³⁶ This was a monumental undertaking because England had remained largely indifferent to the voyages of discovery made by Spain and Portugal, and the English lacked the technical expertise necessary to such an undertaking. Northumberland solicited the services of those with advanced mathematical skills. John Dee was one logical choice. The other was Sebastian Cabot, whom Northumberland bribed away from his position as Pilot-Major of Spain. In Cabot, Northumberland gained not only a skilled navigator with knowledge of modern cartography, but someone who could direct English exploration into the northern waters not claimed by Spain. Cabot brought with him to England the dream of his father John Cabot, who had desired to sail "more and more towards the East . . . where he believed that all the spices of the world had their origin, as well as the jewels. . . ." By exploiting this route, he had hoped to make "London a more important mart for spices than Alexandria."³⁷

Cabot's idea of making England a second Alexandria encouraged Northumberland and the courtiers and merchants he influenced to sponsor the Chancellor-Willoughby Voyage in search of the Northeastern Passage to Cathay. Thus at the court of Edward VI the English dream of a northern passage was born, and it haunted English mariners from this time until the death of Captain John Smith. The idea intrigued John Dee as well, and not only because of the promise it held for trade. Introduced to the Occult by Gerardus Mercator while he was on the Continent, John Dee was aware of the tradition that Initiates and Adepts

of the East held the secret of the Elixir of Life, a secret John Dee pursued all his life.³⁸

Compelled by this dream, and supported by the practical exigencies of government economic policy, John Dee lent his skills to those who sought the Passage. In 1553 he consulted with Richard Chancellor on his preparations for his first voyage in search of the Northeast Passage, a voyage which resulted in the opening of trade with Russia and the founding of the Muscovy Company. In the 1560s, Dee entered the debate at Elizabeth's court over the best route to Cathay,³⁹ and when the decision was made in favor of the Northwest Passage, John Dee instructed Martin Frobisher and Christopher Hall on the difficult navigational problems encountered in high northern latitudes. In 1577 a secret syndicate comprised of Francis Drake, Queen Elizabeth, the Earl of Leicester, Secretary Walsingham, and Christopher Hatton planned to send Drake on what was to be the first circumnavigation by an Englishman. Drake's plan to sail in search of plunder, the Passage, and trade with the East was imparted to Dee, who may have acted as one of Drake's advisors. Dee certainly consulted with Arthur Pet and Sir Charles Jackman on their ill-conceived plan to sail in 1580 through the Northeast Passage to the Pacific and rescue the long-absent Drake, who took three years to complete his circumnavigation. And although Dee was on the Continent when John Davis sailed on his first voyage in search of the Northwest Passage in 1585, he had worked closely with Davis in preparation for the voyage, and considered Davis both a friend and a pupil.

Closely linked with his contributions to the search for the Passage was John Dee's interest in colonization. The Davis Voyages, sponsored under a charter granting the promoters both the right to trade through the Passage and the right to found a colony, were the last in a series of colonizing activities which had occupied Dee's attention since the 1570s. Dee envisioned England as a powerful maritime nation, in control of the northern route to the East, in command of a powerful navy, and dominating a vast northern empire. As an antiquarian, he brought to Elizabeth's attention documents that established English discovery rights to portions of North America.⁴⁰ About 1570, at the request of Edward Dyer, Dee composed the Synopsis Reipublicae Britannicae, which gave Dee's plans for British expansion by means of naval dominance.⁴¹ In 1577, he published his General and Rare Memorial, the first volume of which he called variously The Pety Navy Royall, The British Monarchy, or The Imperium Britannicum. This volume gives Dee's plan for the creation of the navy and the establishment of an English imperial monarchy.⁴² It may have been written in conjunction with the preparations for Drake's voyage, as was evidently the fourth volume, Famous and Rich Discoveries. The volume intended to show how England could establish trade with Asia, the Spice Islands, and eastern Africa, and in it Dee refers to a planned voyage intended to realize this objective.⁴³ The reference could only be to Drake's voyage, and from this evidence it seems likely that Drake owed at least a portion of his success to information gleaned from Dee, and that Dee and Drake both contributed to the expansionist plans circulating at court.

Dee worked closely with Humphrey Gilbert as he prepared to sail in search of the Passage and to found an American colony. When Gilbert was drowned in 1583 on a return voyage from Newfoundland, Dee immediately joined with Walsingham and Adrian Gilbert to form "The Colleagues of the Fellowship for the Discovery of the Northwest Passage." Again the intention was to sail for the Passage and establish a colony, but before Davis sailed, Dee's attention was attracted away by the promises of Continental patrons evidently interested in his skill with the Occult Arts.

As technical consultant to every major English voyage of discovery between 1553 and the Armada, John Dee not only trained navigators in mathematical navigation, he also made important contributions to that science. Some of the most difficult problems in navigation arise when sailing in high northern latitudes, and it was probably when he was working as an advisor to the Chancellor-Willoughby Voyage that Dee first contemplated the solutions to these problems. One of the most pressing needs was for an accurate circumpolar chart. In high northern latitudes, the meridian lines on charts should converge, but the Mercator chart used by Dee had parallel meridians. Although rhumb lines plotted across meridians in high northern latitudes appeared as straight lines on the Mercator chart, Dee knew they should appear as spirals if projected on accurate charts with converging meridians. Probably as a result of his study of the Mercator globe Dee brought from the Low Countries, he designed a chart with the correct projection. The chart, which Dee called the Paradoxal Compass, gives a bird's-eye view of the polar regions. The North Pole is at the center, the meridians radiate in

straight lines from it, and the parallels of latitude are represented as concentric circles. This design, which was crucial to successful circumpolar navigation, is essentially the same as the modern zenithal equidistant projection used by the British Admiralty today, and although it was developed by Magellan's cartographers, Dee is credited with its independent development in England.⁴⁴

Most of Dee's contribution to mathematical navigation was complementary to his development of the circumpolar chart. In 1576, perhaps as part of his duties as technical advisor to Martin Frobisher, Dee wrote down the results of his twenty-five years experience with the navigational problems posed by high northern sailing. The manuscript provided the information necessary to the correct use of his paradoxal compass. He discussed the peculiarities of paradoxal navigation, developed a compass-fly to be used with his chart, drew up the tables necessary for charting position, and discussed methods for determining differences in longitude. In addition it seems likely that he demonstrated the application of trigonometry to the solution of the nautical triangle; that is, the determination of position by triangulation. Once compiled, Dee sought to have this information published. No patron supported the project, however, undoubtedly because the tables and charts he wished to include would have made the costs prohibitive, while the work once published would have attracted only a small audience.⁴⁵ Since his work was never published, the regular application of trigonometry to the determination of position was delayed, although the general lack of mathematical knowledge among mariners was certainly an additional hindrance.

Dee was able to publish a treatise on his circumpolar projection, which he attached to his General and Rare Memorials. This along with his "Preface" undoubtedly contributed importantly to the development of mathematical navigation in England. Indeed, Dee's contribution to the emergence of England as a maritime nation was a substantial one. During the reigns of Edward and Elizabeth, he was closely connected with those in government who formulated England's economic policy. He brought with him to Elizabeth's court the dream of England as a second Alexandria, and articulated the expansionist dreams of Elizabeth's advisors. Moreover, Dee was a pioneer in the development of mathematical navigation. His influence was felt by the navigators employed in the Muscovy Company, to which he was a mathematical consultant for thirty years, and his investigations directed the research of mathematicians who practiced in the 1580s and '90s.

Among the navigators trained by Dee, John Davis was the last and perhaps the ablest. He improved the backstaff first conceived by Thomas Hariot, and wrote two important works on navigation. Moreover, he not only introduced his patron, the merchant William Sanderson, to Emery Molyneux, he also explained in his first book the use of the beautiful and important globes Sanderson commissioned from Molyneux. The Molyneux Globes were intended to introduce Englishmen to the discoveries made by their fellow countrymen, and to facilitate further navigation in search of the Passage.⁴⁶ The edition of the globes demonstrates the importance merchants like Sanderson attached to both the search for the Passage and to navigators skilled in mathematics. Davis's publications and his contribution to the Molyneux Globes testify

to Dee's indirect influence on the development among navigators of an increasingly complex and widespread technical expertise.

Although his influence on navigators was considerable, Dee's influence was felt most among the mathematicians who followed him in investigating the problems of mathematical navigation. Among these was the skilled mathematician Thomas Hariot, who was employed by Sir Walter Raleigh in 1579. Raleigh sought Hariot's services in solving the navigational problems which led to inaccuracy in overseas voyages. Raleigh was familiar with these problems by reason of his own voyage to America in 1578, and the drowning of his half-brother Humphrey Gilbert must have driven home the point. Raleigh was a friend of John Davis, and as a member of The Fellowship sponsoring Davis's voyages, he probably saw to it that Hariot engaged in the technical consultations. At about the same time, Raleigh secured a renewal of Humphrey Gilbert's original charter to seek the Northwest Passage and found a colony. To insure that his ships passed easily to and from his proposed colony, Raleigh sent his ship's masters and captains to school under Hariot. Hariot was familiar with Dee's work, and although he would later concentrate on different areas of mathematics, during his tenure with Raleigh he dealt with the same kinds of problems that had attracted Dee's attention. Hariot gave instructions on shooting the Pole Star with a cross-staff, and on using the back-staff which he invented for obtaining accurate observations of the sun's declination. Included in his instructions for accurate sun-sights are discussions of the instrumental parallax of the cross- and back-staff, the variations caused by instrumental and atmospheric refraction, tables for the

declination of the sun, and the effect of longitude in determining declination. To insure accurate observations at night, Hariot gave the rules for shooting the Pole Star, and provided a discussion of the effect of latitude on accuracy. In addition, sometime between 1583 and 1594, Hariot explained the application of trigonometry to the solution of the nautical triangle. As was the case with John Dee's efforts in the same area, the lack of appropriate tables, and the general lack of advanced mathematical skills among navigators prevented the solution from coming into wide use.⁴⁷

Hariot had the opportunity to put his theoretical knowledge to practical use when he sailed on Raleigh's first ships to Virginia in 1585. This combination of theory and experience was to be typical of the mathematicians who made contributions to navigation in the 1580s and 90s, particularly those engaged in furthering the second aspect of Elizabeth's economic policy: encroachments into Spanish trading territories.⁴⁸ The pursuit of this policy led in 1586-88 to Cavendish's circumnavigation, which followed Drake's route. Cavendish took with him the mathematician Robert Hues, who sailed a second time with Cavendish on his ill-fated voyage to the Pacific in 1591. His experience with navigational problems resulted in his Tractatus de Globis et Eorum Usu (1594), which Hues dedicated to Sir Walter Raleigh.⁴⁹ Hues wrote the book to explain the use of the Molyneux Globes, and asked his friend Thomas Hariot to contribute the section on rhumb lines. For some reason, Hariot did not do so, and Hues became the first Englishman to explain clearly the use of rhumb lines in charting. His treatise on the globes remained the standard for nearly a century, and its translation into

French and Dutch demonstrates that England's technical achievements in navigation were now solicited on the Continent.⁵⁰

If Cavendish's voyages into Spanish territorial waters contributed eventually to Hues's work, the war with Spain triggered even more immediate improvements in navigational practice. In 1585 England for all intents and purposes became openly engaged in naval war with Spain. Those engaged in naval operations soon realized that successful interception of Spanish ships depended upon accurate position finding and plotting. It was because of this need that Edward Wright was "called forth to the public business of the Queen,"⁵¹ and commanded to give his help as a skilled mathematician and cosmographer. In 1589 he was assigned to sail with the Earl of Cumberland to the Azores, where Cumberland was to intercept the Spanish treasure fleet. In his attempts to plot courses of interception, Wright perceived the inaccuracy of the plane-chart drawn with parallel meridians. He confronted the same problem to accuracy that led Dee to design the Paradoxal Compass, and spurred by the demands of war, Wright, too, devised a solution which is known today as Mercator's Projection. Called "the greatest advance ever made in marine cartography,"⁵² Wright's projection onto Mercator's chart involved the relative extension of distance between the parallels of latitude, and it is the projection commonly employed by modern navigators.⁵³ It was probably anticipated by Thomas Hariot, who was naturally working on the problem as a result of his involvement with navigation in high northern latitudes.⁵⁴ Hariot's failure to publish again cost him the credit for an important development, but the fact that he came independently to the same solution as Wright indicates the

increasing sophistication of mathematical skill in England.

The exigencies of war contributed not only to the development of mathematical navigation, but to the application of mathematics to ballistics as well. A turning point in the English appreciation of ballistics had come in 1569, when the slave trader John Hawkins returned from Mexico with the news that he had engaged the Spanish fleet at the port of Ulloa. Although he did not win the battle, Hawkins escaped with two Royal ships after sinking the Spanish flagship, the second-in-command's flagship, as well as a third ship. This was no small achievement, and when Hawkins explained that it resulted not from the usual close bombardment and hand-to-hand combat, but from his reliance solely on long-range cannon fire, the Navy Board took the steps necessary to re-tool their existing ships, and to redesign the plans for future ships in order to better suit them for long overseas voyages and naval engagements of the type Hawkins described. In addition, the redesigning of merchant ships was encouraged.⁵⁵

Nor was the government slow to appreciate the need for technical research into ballistics. Not long after Hawkins's return, William Bourne sent Lord Burghley, who contributed more than any of Elizabeth's statesmen to the development of the Navy, his translation of Tartaglia's treatise on ballistics. Although Burghley appreciated The Art of Gunnery enough to promote Bourne as a gunner, Bourne lacked advanced mathematical skill and relied on the earlier work of Leonard Digges for some information.⁵⁶

Perhaps prompted by his recognition of Bourne's dependence on Leonard Digges, Thomas Digges completed his father's unpublished work on

ballistics Stratiticos (1579). Digges, who had been both ward and student to John Dee, enjoyed the patronage of the Earl of Leicester, and his research between the years 1576 and 1587 reflect the interest of his patron as well as those of his father and John Dee. In addition to providing the first translation of Copernicus in his new edition of his father's Prognostication (1576), Digges discussed in the same work "certain errorrs touching matters of Navigation." He analyzed some of the same problems as had Dee, and presented the first original discussion in England on the variation of the compass. Digges combined his interest in mathematical navigation with his interest in ballistics when he completed the Stratiticos. His work is dedicated to Leicester, and in it Dee discusses the application of algebra to ballistics, dealing specifically with the problem of successfully bombarding a moving target. Leicester, who was charged with preparing the English land defenses against the expected Spanish invasion in 1587, evidently relied upon Digges's knowledge of navigation and ballistics in the execution of his task.⁵⁷

England emerged from the Armada year as a pre-eminent maritime nation. She had been prepared for her new status by the far-sighted policies of government advisors, the ambitions of courtiers and merchant-adventurers, and the research of the mathematicians they patronized. John Dee had promoted the idea of England as a second Alexandria and he along with Walsingham, the brothers Gilbert, and Sir Walter Raleigh had dreamed of making England the mistress of a northern empire. The threat posed by Spain had been anticipated and met with the redesigning of ships and an improved appreciation of ballistics. The execution of

these government policies had led to important developments in marine cartography, and to pioneering research into the practical applications of geometry, trigonometry, and algebra. Thus the emergence of England as a maritime nation and the development of mathematics went hand in glove, and resulted from the cooperative endeavors of government, private investors, and scientists.

Such cooperation was not fortuitous. It had characterized the execution of England's economic policies since the Duke of Northumberland laid the plans to seek the Passage to Cathay. Moreover, the desire to inform the general public of the aims of the government navigational projects as well as the need for trained men to participate in them led to the active promotion of public education. The interest in education is evidenced by the increased number of vernacular publications dealing with mathematics, and by the fact that most of these books were dedicated either to the courtiers and statesmen most closely connected with martial and exploratory ventures, or to the Governors of the Muscovy Company, who played a key role in sponsoring the voyages in search of the Passage. Although the vernacular texts made a crucial contribution to disseminating mathematical information, there was a growing recognition among those involved in promoting the overseas voyages that these textbooks alone were not sufficient to train the necessary technicians. The need was for a new kind of academy, one in which the practical application of knowledge was emphasized.

Between 1562 and 1587, the Crown was petitioned repeatedly for the establishment of an academy of this sort. The first such petition came from Stephen Borough, who had been one of the principal navigators

during the reigns of Edward VI and Queen Mary. His request was for the creation of a Chief-Pilot to oversee the training and licensing of mariners. Although the Crown did not grant Borough's petition, Borough was appointed one of the four commanders of the Royal Ships at Medway, and in this position he initiated many of the reforms he desired.⁵⁸ Further notice of Borough's grievances was taken by Lord Burghley when he drafted the far-reaching Act Touching Certain Politic Constitutions made for the Maintenance of the Navy (1562). Burghley's provision that fishermen and mariners may not be taken as soldiers makes Burghley the first English policy-maker to recognize that England's defense depended on her expertise at sea, and the Act reflects Burghley's desire to promote stability among the trades which rely upon navigation and to provide for well-trained seamen.⁵⁹

Helpful though Burghley's measures were, they did not promote training in mathematics for seamen. To adequately train the men needed for successful overseas exploration, warfare, and colonization a more broadly-based formal system of education was needed. Conscious of this need, Humphrey Gilbert petitioned the throne in 1572 for the foundation of a "Queen Elizabeth Academy,"⁶⁰ which would teach the application of science to practical affairs, particularly to navigation and the martial arts. Perhaps because of the novelty of the idea, the Crown did not grant Gilbert's petition, but two years later its essential features were embodied in the will of Sir Thomas Gresham.⁶¹ Gresham had served three monarchs as Royal agent in the Low Countries, had founded the Royal Exchange, and his brother Sir John Gilbert had been actively involved with the Muscovy Company since its foundation.⁶² Gresham was

aware of the importance of overseas commerce to England and of the importance of technicians trained in mathematics to the success of such commercial ventures. Although Gresham envisioned a College with a complete curriculum, the important provisions of his will are those dealing with the practical application of mathematics. The will provides for a geometry professor "to lecture for one term on arithmetic, the next on theoretical geometry, and the third on practical geometry." A professor of astronomy was to lecture on "the principles of the Sphere and the theoriques of the planets, and to explain the use of common instruments for the capacity of mariners." Gresham intended the students to be "merchants and other citizens" and ordered that the lectures be delivered in English to the "pitch and capacity" of the listeners.⁶³

It was not until the death of Gresham's wife in 1596 that Gresham College was founded. In the meantime, efforts to found an academy continued. Richard Hakluyt included a plea for endowing a college in his Preface to the Divers Voyages (1583), which he dedicated to Sir Phillip Sydney. He also approached Sir Francis Drake, who was willing to provide an annual living of twenty pounds, but no professor could be found to lecture for this fee.⁶⁴ In 1584 Hakluyt wrote Walsingham from Paris, which had a well-endowed mathematics lecture, and asked him to solicit the Queen for the establishment of a mathematics lecture at Oxford and a school of navigation in London. He reminded Walsingham "howe necessaree for service of warre arithemetick and geometrie are, and for our new discoureries and longe voyages by sea the arte of navigation is, which is compounded of many partes of

the aforesayd sciences."⁶⁵

Despite Hakluyt's reminder to Walsingham, it was in the private sector that the combined need for defense and successful overseas voyages led to the creation of a public lecture on mathematics. In November, 1588 the merchants of London organized their militia to prepare for the Spanish invasion they assumed was imminent. To insure that their captains were adequately fitted for war and to create a pool of men capable of mathematical navigation once the war was over, the city merchants Thomas Smith and John Wolstenhome, along with Lord Lumley, commissioned the mathematician Thomas Hood to lecture at Leadenhall on geometry, astronomy, hydrography, and navigation. The lectures continued into the 1590s,⁶⁶ and in conjunction with them Hood wrote a number of treatises which explained by means of dialogues between Master and Pupil the subjects he had been commissioned to teach.

The establishment of the Hood Lectures in 1588 serves to gage the rapidity with which England closed the gap between her achievements in navigation and mathematics and those made on the Continent. In 1553 Northumberland had to bribe Sebastian Cabot away from Spain in order to have the services of a skilled navigator; the only instrument maker of note in England was foreign born and trained; and although John Dee had been educated at Cambridge, he gained his expertise in mathematical navigation on the Continent. The trade with Russia which resulted from the Chancellor-Willoughby Voyage was the sole route opened as a result of English voyages of exploration between 1553 and Elizabeth's accession. By 1588 England had a pool of skilled navigators; the instrument makers were native born and could boast among their members

Robert Norman, the discoverer of the magnetic dip; and English mathematicians were regularly consulted before overseas voyages, while London offered public lectures in mathematics. English ships continued to trade along the Muscovy Route and English explorers had taken the first tentative steps towards establishing colonies in America. Encroachments into Spanish trading territories and the capture of Spanish treasure fleets sailing from the New World brought money into Elizabeth's pinched treasury. The most successful maritime venture to the year 1588, Francis Drake's circumnavigation, netted the crown sufficient profit for Elizabeth to discharge one year's interest on the national debt⁶⁷ with enough left over to invest in the parent corporation of the East India Company.

In forty years, England had emerged from dependence on foreign sources for its mathematical information and the manufacture of navigation instruments. By 1587 English mathematicians had contributed importantly to the practical applications of mathematics, had improved the design of navigational instruments, and were teaching English navigators to rely less on geometrical instruments and more on pure mathematical calculations.⁶⁸

Because these scientific achievements were stimulated by the dream of the Passage and the naval war with Spain, science in England was as inextricably linked with the dreams of Empire and martial prowess as was Marlowe's Tamburlaine. The recognition of this link between war, expansion, and science is seen in the efforts to promote public education in the sciences. Those who promoted public education were deeply involved with martial and expansionist schemes, and the interest

in training skilled technicians is shown by the efforts of Borough, Burghley, Gilbert, Hakluyt, Drake and Gresham, as well as by the founding of the Hood Lectures and the increased number of vernacular texts on mathematics. These texts introduced their readers to the major configurations of the New Science and to the unlimited opportunities available to those who mastered them. As Dee's "Preface" demonstrates, the rhetoric of the New Science spoke of personal profit, social change, a reliance on experience, and a new Platonist epistemology at the same time that it emphasized the tremendous potential for England inherent in the application of mathematics to practical affairs. The sense of opportunity and adventure released by the exploits of Hawkins, Drake, Gilbert and Raleigh were thus bound together with the advancement of science: the young men who were stimulated by Drake were schooled by Dee. It is safe to conclude that by 1587, those members of Elizabethan society who circulated at court or who engaged in commercial expansion were well aware of both the content and the promise of the New Science. Science was seen as the instrument of social change, and the prospects of the change seemed wholly salutary.

III

There was, however, another side to the coin. Developments in scientific inquiry and observation contributed, as we have seen, to an

optimistic picture of the future because they fostered a belief that society could cooperate in achieving common economic goals. But these same developments contributed as well to a pessimistic counter-current. The pessimistic attitude towards the future was premised on the assumption that the physical world was decaying, society disintegrating, and the Second Coming imminent. Contrary though it was to the attitudes otherwise fostered by scientific inquiry, this pessimism did not constitute a negative reaction to science. Those who sought to demonstrate that the world would soon end relied on scientific authority and accepted both the Platonic underpinnings of practical science and the hypothetical or inductive approach to investigating natural law.

This deference to scientific authority obtained for two reasons. The traditional role of mathematicians had always included astrology and while the mathematicians of the time looked to Platonic number theory as the basis for their work in practical mathematics, they also used Neo-Platonic number magic in their astrological calculations. Mathematicians therefore contributed to advancements in applied technology while continuing to manipulate numbers as magical symbols. In addition to playing this traditional role, astronomers brought to public view new information about stellar phenomena. The astrological practices combined with the new observations reinforced the idea that natural phenomena presaged dire events, and that society and the physical world were decaying.

While the differences between the application of mathematics to mensuration and the manipulation of numbers as magic symbols were recognized by mathematicians of the time, the boundaries between the two

applications were indistinct. Because they believed in a unified creation in which disruptions in nature signalled disruptions in society, mathematicians accepted as part of their duties the analysis of heavenly portents. John Dee's practices are the most notorious in this regard, but they are different only in degree from the practices of his contemporaries. Leonard Digges, in the Prognostication Euerlasting, accepts the validity of natural astrology. The Prognostication gives instruction on weather prognostication, discusses the relationships between planetary conjunctions and medical practices, and mentions the portentous implications of comets and eclipses.⁶⁹ Similarly, Robert Recorde in the "Preface" to the Castle of Knowledge tells his readers there was "neuer anye greate chaunge in the worlde, nother translations of Imperies, nother scarce anye falle of famous princes, no dearthe and penurye, no death and mortalitie, but GOD by the signes of heauen did premonishe men thereof, to repent and beware betyme, if they had any grace" (Recorde, sig. a.v.).

The public relied on numerous almanacs and prognostications for predictions, based on natural astrology, of the weather and harvest. The Short Title Catalogue lists one hundred and forty authors or compilers of almanacs and prognostications during this period. Nearly every London bookseller published them, and many of the authors kept at the work of compiling almanacs for twenty or thirty years.⁷⁰ Since the author generally signed himself "Doctor in Physick and Astronomie," the reader was aware of the author's mathematical skills.⁷¹ The authors were generally reputable: Dr. Richard Foster, for example, enjoyed the patronage of Leicester; many of the authors held M.A.s and

consequently were in holy orders. Far from pandering to the simple credulity of the vulgar, most of these publications had a practical purpose. The works of Leonard Digges and William Bourne, for instance, provided accurate tables of the sun's declension and other information on stellar changes for the benefit of navigators and seamen.⁷²

While the general public accepted astronomers as authorities on the effects of natural phenomena, they had also learned to expect that prognostications on a specific comet or eclipse would foretell some dire event. As Recorde's remarks indicate, the book of the heavens usually told a story of upcoming catastrophes to those who cared to read it. Heavenly signs were regarded as warnings to the wicked that they would soon be punished; they were reminders of the mutability of the sublunary world and of the ephemeral nature of man's life. But until the 1570s, they were not generally interpreted as presaging either the impending doom of the entire world or any universal disruption of the natural order.⁷³ Thus Recorde, while reminding his readers that God sends signs to individuals to remind them to "repent and beware" before an empire falls or a plague comes, he is confident that the universe as a whole is stable: "yea, thoughe all other thinges in the worlde by time be consumed and euen the moste harde metals freted into drosse, yet the liquide heauens not only gouerne time it selfe, but vtterly stande cleere from all corruption of time" (Recorde, a. iiii^v).

Recorde is mindful, of course, that the world will someday end with the Second Coming of Christ, and he reminds his reader that the Biblical prophecy gives an important reason for careful attention to the heavens: "But aboue all other thinges the testimonye of Christe in the

scripture doth most approue it, when he doothe declare that signes of his comming, and of other straunge effectes shall be seene in the Sonne, Moone, and Starres" (Recorde, u.n.). Recorde's attitude towards the Second Coming is traditional: the Second Coming is in the future, but it is not imminent; in the meantime, the stars offer portends of immediate though temporary disruptions in the daily course of events.⁷⁴

Robert Recorde wrote in 1556, during the reign of Queen Mary. In Elizabeth's reign, beginning around the 1570s, there appears in popular publications a new attitude towards the meaning of unusual natural phenomena. An increasing number of authors regard comets, eclipses, earthquakes and the like not as portents of some temporary disruption in an essentially stable universe, but as signs that the world is decaying and that the Second Coming is imminent. The origin of this new emphasis is difficult to trace precisely. The idea of a decaying world was a traditional one hearkening back to the Church Fathers, particularly Lactantius and St. Cyprian, who argued that the world would decay, be destroyed, and restored to a new order by the Coming of Christ. The pamphlets reflect as well the influence of Reformation writers who interpreted the Apocalypse of John as prophesying the course taken by western civilization after the death of Christ. These revisionists identified the Papacy with the anti-Christ and argued that since the Anti-Christ had come, the Second Coming would soon occur.⁷⁵

The authors of these doomsday pamphlets enlisted as a matter of course the authority of astronomers. None of England's eminent mathematicians themselves wrote doomsday warnings, but the authors of the predictions refer to the mathematicians as their authorities. The

public found mathematicians cited in pamphlets which foretold that a comet portended not a bad crop, but the end of the world; not some temporary disruption in an essentially stable natural order, but a decay into annihilation. The habitual reliance of the public on the authority of natural astrologers to predict weather and the effect of eclipses was therefore firmly coupled with the Christian belief in the Second Coming. This new link forged by judicial astrologers meant that scientific inquiry into stellar phenomena would contribute as much to a mood of pessimism about the future as it did to an optimism.

The publications inspired by the supernova of 1572-74 provide particularly clear evidence that doomsday writers drew on the authority of astronomers. The new star was visible for seventeen months, and it did not change position in relation to the fixed stars. For this reason, those possessed of rudimentary astronomical knowledge might themselves deduce that the star was outside the sublunary sphere.⁷⁶ But it was the careful observations by Dee and Digges, who failed to determine a parallax, that definitely proved the star was something new in the incorruptible heavens. In 1573, Dee published his conclusions in his Parallacticae Commentationis Nucleus Quidam, a book which dealt with the trigonometric theorems for determining stellar parallax. Dee also composed but did not publish a work dealing more extensively with the star, "De Stella admiranda in Cassiopeiae Asterismo." Digges published his conclusion in his Alae seu Scalae Mathematicae (1573).

The public was aware of the conclusions drawn by Dee and Digges. Holinshed for one informs his readers not only of the new star, but of the observations made by Dee and Digges as well:

And one thing is herin cheefelie to be noted, that (by the skill and consent of the best and most expert mathematicians which observed the state, propertie, and other circumstances belonging to the same starre) it was found to haue beene in place celestiaall far aboue the moone, otherwise than euer anie comet hath beene seene, or naturallie can appeare. Therefore it is supposed that the signification thereof is directed purposelie and specialle to some matter not naturall, but celestiaall, or rather supercelestiaall so strange, as from the beginning of the world neuer was the like.⁷⁷

It seemed natural to Holinshed that he should comment on the "signification" of the star. It seemed equally natural to Digges. In his preface he tells the reader the star is a true miracle and a message from God ("Hoc ipsum rarissimum signum vere miraculum, Deique nuntium") and he urges all men to study this "stupendum Dei miraculum."⁷⁸ Although neither Holinshed nor Digges were willing to comment on the specific portent of the new star, others were.

In 1577 Thomas Rogers translated a work by Sheltoo a Geveren, which Rogers entitled Of the ende of this world, and the seconde commyng of Christ. The work saw five editions between 1577 and 1589. Rogers attempts to demonstrate that recent comets and eclipses, coupled with the appearance of the new star and certain unusual planetary conjunctions, signify the imminent end of the world. The reader is prepared for Rogers' arguments by a prefatory verse written by Theodore Beza who, like Rogers, was a clergyman. The verses are occasioned by the supernova, which for Beza signified the return of Christ:

This is that Starre, which to the citie small of David
 The three Wysye men sometyme from out the East did theither
 bryng.
 Al that which once whē Christ was borne did leade thē with
 his light
 Returnyng now declares, that Christ returnes agayn in
 might
 Wherefore you blessed crue of Saintes, and godly men,
 be glad,
 And bloody tyrant Herode, stande in feare, and be thou
 sad.⁷⁹

Christ. In fact, all social disruption, for Rogers, serves as evidence of a divine pattern and in his effort to link scientific inquiry with religious prophecy he takes pains to catalogue signs of both physical disruption and of social disintegration. He echoes St. Cyprian in his lament over the decay of nature:⁸⁰

There are . . . signes of the oldnes of the world, and of his ouerthrow: because we plainly perceyue al things dayly to waxe woorse and woorse, and decrease in their vertue. The ayre is oftentimes corrupt, sometyme with vntymely showres, sometyme with vnprofitable dryenesse, now with too much cold, now with extreme heate. The fruitfulnessse of the fielde is not such as it hath been aforetyme.

(Rogers, p. 11)

The passage continues with an anatomy of social abuses, decrying in the tradition of Lactantius and Classical writers, the decline from the Golden Age:

Richesse and substance we see consumed: The progenie of Great and Noble men, we perceyue dayly to be multiplyed, but their patrimonie is no whit encreased, but impayred by discorde. By which it commeth to passe, that many Great men, and Lordes, bende all their cogitations to the oppresing of their poore Tenants, and by often fynes and exactions, bryng honest men to beggery, and by the example of Pharao make slaues of their seruantes and subiectes: as though they were appoynted of God to lyue, not for the defence of the good, punishment of the wicked, and preseruacion of iustice, but to them selues, and to pamper their bellyes with good cheare, and their backs with braue apparell. And therefore doo those Empyres now shew them selues to be as cankered and rusty yron, which tymes past, were as bryght Siluer, or glitteryng Golde.

(Rogers, p. 12)

The decay of nature occasions the decay of society. Crops fail, rents rise, the distance between the poor and the rich increases. Moreover, says Rogers, these disruptions signal a radical disruption of the mathematical proportions upon which creation is based. Rogers, like

Dee, refers his readers to Plato to learn of the geometrical proportion employed by God in the creation of the world (Rogers, p. 33). This geometrical proportion should govern the microcosm as well as the macrocosm, but this is not the case:

Likewise much lesse is the Geometrical proportion kept in this wicked world. For the wicked and vnlearned being in face impudent, and in behaiour egregious Parasites, are exalted to great honour, and glorious offices, when as men famous, as well for learnyng, as Religion, be either in Court condemned, or of Sycophantes defaced, or vnwoorthely disgraded, for some light offence. . . .
(Rogers, pp. 35-36)

The conduct of society demonstrates "that in this world no Geometricall equalitie according to the distributiue iustice, (which is the best) is any where obserued" (Rogers, p. 37). But since God is always just, we must assume "that the Lord God doth foresheew to the studious, by this double proportion . . . a certain finishing of things with an vtter destruction of this wicked worlde" (Rogers, p. 37).

In his reference to Platonic doctrine of the essential quality of number, Rogers' discourse echoes the authors of mathematical texts and manuals. In his reference to the doctrine, Rogers combines traditional religious beliefs regarding the Second Coming with the philosophic underpinnings of the new science, although Rogers is interested more in Neo-Platonic number-magic than he is in the application to number to mensuration. He establishes that the world will soon be 5555 years old, and explains why these numbers are significant:

The Pythagorians, and Platonistes, men of great aucthoritie, haue thought many things to consist in these, and haue woondred thereat: for the lowest number in the highest, hath in itself a perfect Arithmetically proportion, and from the lowest to the highest, it comprehendeth within it a perfect Geometricall equalitie.

And Plato in another place greathly dooth wonder at the Arithmetical, and saith, that the same doth make the mynd apt for al speculation and, practise. And he doth adde moreouer, that numbrying is gyuen of God hym self to man, as a necessary instrument of reasonyng and discoursing. . . .

(Rogers, p. 32)

While Rogers' interest in the magical significance of five is not shared by those who wrote the vernacular scientific books, his concurrence with the Platonic doctrine of essential number agrees with the primary importance attached to Plato in the works of Recorde, Dee, Thomas Digges and others.

In addition to his use of Plato, Rogers praises inductive reasoning for the same reasons as do the mathematicians. We recall that Dee advises his readers not to accept the authority of Archimedes until they had tested his theories and deduced a "universall Experience" (Dee, sig. C. i^v). Norman published his findings on the magnetic dip with the hope that "skilful trauailers by sea and land" would test them by their own observations in order that "some generall conclusion may be inferred" (Norman, sig. A. ii^v). Thomas Digges, though an advocate of Copernicanism, argues in his Alae that no theory ought to be accepted until it has been thoroughly tested: "I have perceived that the Ancients progressed in reverse order from Theories, which were clearly false, to seek after true Parallaxes and distances, when they ought rather to have proceeded in inverse order, and from Parallaxes, which have been observed and are knowne, they ought to have examined theories."⁸¹ In his discussion of astrology, Rogers also advocates observation as the acid test of any theory:

from these things do cunnyng Astronomers fetch their coniectures, because through a certayne order which the starres doo keepe, they haue by long vse obserued very many things, that so from a true observation of principles, they may bryng foorth general coniectures, whose euent doo marueylously agree togeather. And that there is a certayne order, or a true course of the starres, that woonderfull agreeing togeather of yeares, continually in great alteration of kyngdomes, and Religion, which hath been marked, is a greate prooffe.

(Rogers, p. 21)

Rogers' comments on the astrologer's use of "true observations" and "general coniectures" give the discussion a kind of scientific veneer because of their resemblance to similar remarks by Dee, Norman, and Digges.

This resemblance obtains not only in Rogers' references to inductive reasoning, Plato, and geometrical proportions, but in the religious tone of the tract as well, since Recorde, Thomas Digges, John Dee, Robert Norman and many of their contemporaries were anxious to demonstrate that the study of mathematics was the proper study of God's work. The distinction between Rogers' application of mathematics and that made by practical mathematicians is blurred even more by Rogers' failure to state the differences between astronomers and astrologers, but since the mathematicians of his day made little distinction between the two there is no reason why Rogers should.

Other doomsday writers employ many of the same methods as Rogers. Francis Shakelton, although less interested than Rogers in explaining the methodology underlying judicial astrology, makes an even more specific appeal to recent scientific discovery in his A blazyng Starre or burnyng Beacon (1580). Shakelton's treatise was occasioned by the comet of October, 1580, and he interprets its meaning in the context of

the Second Coming. Shakelton says in his dedicatory epistle his "drift herein . . . is to dissuade the worlde, from freezing in the dregges of their synnes, by admonisheyng them of the finall dissolution of the Engine of this worlde, and seconde commyng of Christ, whiche by many manifest and ineuitable reasons I gather, can not bee farre of" (Shakelton, sigs. a. ii^v-a. iii).

Unlike Rogers, Shakelton argues that the celestial sphere is decaying, and he derives his conclusions from calculations made by mathematicians on the distance of the sun from the earth:

if wee will giue credite to the Mathematiques, constitution of the celestiaall worlde, is not the same that it hath beene in tymes paste, for so muche as the Sunne, is not so farre distant from us now, as it hath been heretofore. So that some dooe affirme, that the distance between the Sonne and the earth (which is the centre of the worlde) is lesse now, by the fourth part almost, then it was in the tyme whē Ptolomeus liued. Where hence thei do coniecture and gather, that the Sūne (at this daie) is nerer unto vs by 9976. German miles then it was before.

Wherefore, if there is so greate alteration in the superior worlde, what shall wee saie of the inferiour: Let this therefore be a forcible argument to proue, that the world shall haue an ende: for so muche as it doth waxe old, and euery part thereof doeth feel some debilitie and weakenesse.

(Shakelton, sigs. A. iiiii^v-A. v)

Shakelton here combines the traditional argument for the decay of the world with evidence from the scientific sector, and concludes that it is both the earth and the heavens which are decaying. He demonstrates his respect for mathematicians again when he discusses the meaning of the supernova and refers his readers to Digges's Alae:

in the iudgement of the moste experte Astronomers, (and suche as are moste skilfull in the Mathematiques in this our tyme and age) that starre which did then appeare vnto our sighte, was no Comete, but mere supernaturall,

directly opposite to the Starre, which appread at the Nativitie of our Sauour Christe, and placed in the verie intersection of the Aequinoctium Terrestre and therefore maie worthely be tearmed or named a signe, vnto the whole yearth. As more at large appeareth in a Booke, which was written by that worshipfull gentleman maister Thomas Digges, called *Alae, seu Scalae Mathematicae*, where the miracle is by demonstrations Mathematicall, plainly and most manifestly proued. Unto whiche booke I doe referee all those that are desirous to be resolved of that Starre sufficiently.

(Shakelton, sigs. D. iii-D. iii^v)

Having hitched his argument to the authority of astronomical observation, Shakelton forges the link between scientific observation and Biblical prophecy. He reminds his readers that Christ foretold his return would be accompanied by "warres and rumours of warres . . . and . . . Famine, and Pestilence, and earthquakes in divers places"; and, of course, by the persecution of those who preached the true Gospel (Shakelton, sigs. B. vi, B. vi^v). Shakelton demonstrates that the conditions for the Second Coming have been satisfied: there are innumerable wars; there was a wheat famine in the "fifth yere of Queene Marie"; there have been numerous outbreaks of pestilence in London; there was a severe earthquake in 1580; and Protestants suffered severe persecution at the hands of Queen Mary.

For Shakelton, as for Rogers, social disruptions are a necessary part of the divine pattern. These disruptions, coupled with the observations made by Digges and other mathematicians, provide convincing evidence that the divine pattern is about to be fulfilled. To reinforce his argument, Shakelton catalogues a number of comets and the unfortunate events which followed them, until he arrives at the comet of 1580. This he argues is the sign sent by God to warn us of the final days:

knowe you therefore (deare Christians) that it is now the good purpose, and diuine pleasure of almightie God: (as well by this burning Comete, whiche now appeareth: as also by the late dreadfull yearthquake, but moste cheefly by that supernaturall Starre of all others, that was seene in Cassiopeia, with other such strange and wonderfull sightes and monsters in nature) to moue and stirr up all the sorte of vs . . . to be mindfull of the Judgement daie.

(Shakelton, [sig. Dvi^v])

Shakelton, like Rogers, is more interested in urging sinners to repent before the Last Judgment than he is in saying exactly when the last day will come. Both Rogers and Shakelton knew the years 1583 and 1588 would witness an unusual conjunction of planets and they like many others, base their predictions on these conjunctions.⁸² Although they shy away from saying precisely what one or the other of those years will bring, Richard Harvey was not so cautious, as he demonstrates in his Astrological Discourse vpon the . . . greate Coniunction of the two Superiour Planets Saturen & Iupiter (1583).

Harvey's treatise was occasioned by a challenge from his brother Gabriel:

Good Brother, I haue in some part done my endeavour to satisfie your late requeste, wherein you aduertise mee either not so much to addict myselfe to the studie, and contemplation of Judiciall Astrologie, or else by some euident and sensible demonstration, to make certaine & infallible prooffe what general good I can do my countrie thereby, or what speciall fruite I can reape thereof vnto myself.

(Harvey, sig. A. ii)

Although Harvey embraces the title Judicial Astrologer, he is aware of the disapproval which the profession sometimes arouses. In his dedicatory epistle to the Bishop of London, Harvey acknowledges this attitude: "You may haply maruell what I meane . . . to deale my selfe

in any such matter of Astrologie being shortly to professe Diuinity (so soone as my place in the Colledge shall call me thereto)" (Harvey, "Epistle Dedicatory," p. 2.).

Anxious to prove judicial astrology is reputable, Harvey refers to other mathematical authorities. After listing a number of Continental mathematicians, Harvey mentions the contemporary English mathematicians who practice astrology:

To let strangers go, these of fresh memorie haue bene none of the basest scholers in England: M.D. Battes principal Phisition to king Henry the eight, Sir Thomas Eliot, Sir Thomas Smyth, who as you best know, and haue both truely and honourably testified in your Musarum lachrymae, excelled therin: M.D. Recorde, both the Digges, M. Dee, whome hir maiestie vouchsafeth the name of hyr Philosopher: M. Securis, M. Buckmaster, M. Mounflowe, M.D. Twyne, besides most of our chiefe doctors in Physike, as namely our M.D. Baro, in Cambridge, and M.D. Foste in London, and some of our very chiefest Philosophers in either Uniuersitie.

(Harvey, sig. A. iii)

Harvey includes in his catalogue men like Buckmaster who were exclusively almanac writers⁸³ and men like Dee and Thomas Digges who practiced both practical mathematics and natural astrology. Presumably in Harvey's mind there is little distinction between the two kinds of practice.

Predictably, Harvey buttresses his defense of judicial astrology with a nod in the direction of Plato:

Platoes opinion is, that our eies were principally giuen vs for this vse and end, to be occupied in the contemplation of the heauens, whereunto he attributeth so much, that he thinketh Astronomie and wisdom to be so inseparaly linked and chained together that neather a very wise man can want Astrologie, nor a very good Astrologer want wisdom.

(Harvey, sig. G. iiii)

Having bolstered his case with allusions to both mathematicians and Plato, Harvey gives his predictions for the alarming disruptions in weather and social order which will occur following the conjunction of Jupiter and Saturn:

great aboundance of waters, and much cold weather, much unwonted mischiefes& sorow, much enuie, debate, quarelling, hatred and strife, many grievous and bitter contentions, much going to lawe on with another for deade mans goodes, and olde reckonings, manifold troubles, and sodaine uproares, much violent oppression, extreame pouertie, hunger and miserie to the needie and impotent sort of people, great persecutions of Ecclesiasticall persons, much despitefull, iniurious, and wrongfull dealing, as also the tragical ruine& destruction of sundry great men and noble personages, bothe olde and young, whereof some shall trecherously be entangled & entrapped, some violently ouerthrowne with shamefull disgrace and dishonour, losing both estimation, goods and life too. Great feare and dread shall come sodainely upon the people, a great sterilitie and barrennesse of the earth that ensue, manifold submersions, shipwracks . . . burnings, and such other, waterie and fierie calamities will followe. . . .

(Harvey, p. 16)

With this catalogue of natural disasters and social disorders, Harvey leaves his prognostication for the year 1583 and turns to the larger question of the Last Judgement. He is distressed because the conjunction of 1583 ends a cycle in which Saturn and Jupiter have passed through the "watery Trigone" (Cancer, Scorpio, and Pisces), and will not proceed through the "fiery Trigon." This new cycle will be a time of "wonderfull alteration," which will perhaps include the coming of Christ. To support his assumption, Harvey engages in some number magic, calculating that the world has no more than 500 years until the final year 6000. But, says Harvey, we should not be too confident that the earth will last those five hundred years because "some euen of

those [years] that are yet behind, shall be abridged in respect of our infinite sinnes, & exceeding wickedness" (Harvey, p. 42). Moreover, we should not forget the prophecies of ancient astronomers who predicted the year 1588 would be one of terrible calamities. And to make his argument even more convincing, Harvey adds the fillip that the predictions for 1588 were "resolutely defended in a publique disputation in the laste Commencement, by one, sufficient to maintain the assertion" (Harvey, p. 44). Not only do ancient astrologers and modern scholars regard the year 1588 with trepidation, the many earthquakes, comets, eclipses, and social abuses indicate that the fulfillment of the Biblical prophecy, while it may not come in 1588, is nonetheless at hand.

Richard Harvey's treatise is more rabid in tone than either Shakelton's or Rogers', but his insistence that natural phenomena pre-
 sage the imminent end of the world, his solicitous attitude towards contemporary mathematicians, his acknowledgements to Plato, and his quasi-mathematical calculations place his work in the same basket as theirs. In addition, as Harvey himself indicates, he was not alone in supposing that the years 1583 and 1588 would be portentous. Rogers and Shakelton, as we have seen, assumed it as well, and other predictions published in the year 1583 are based on the belief: for example, Robert Tanner's Probable Coniectures from the Corse of Tymes (1583) also foretells the end of the world.⁸⁴ Not all the predictions on the 1583 conjunction assumed the imminent destruction of the world. Thomas Heth's Manifest and apparent confutation on an Astrological Discourse, evidently a response to Harvey, argues that the conjunction will not be

as evil in its effects as is often assumed, and that the conjunction is a token to the wicked to repent. Heth's Confutation is especially interesting because he relies on Copernicus, and says that every astrologer must know him.⁸⁵ Heth was joined in his admonishment of Harvey by Harvey's brother John, who in 1588 published A Discoursiue Probleme Concerning Prophetes. Harvey was a physician, and he accepts the validity of astrological predictions, but feels the doomsday prognosticators carry the point too far. For one thing, they unduly frighten the people; for another, they are inaccurate.⁸⁶ Thus even the moderate voices of the Copernican Heth and the physician Harvey lend their authority to astrology, although they are less anxious to wave the red flag of doom before their reader's eyes.

The most sustained and reasoned attack on astrology written at this time came from the pen of Lord Henry Howard, a most unlikeable fellow.⁸⁷ Published in 1583, A defensatiue against the poyson of supposed Prophetes presents the rarely defined distinction between astronomers and astrologers. Howard says he has no quarrel with the legitimate scientific inquiries made by astronomers:

My meaning is not, to declayme against the knowledge of the certayne course of heauen, of Planets with theyr motions, eclipses, & such other naturall and ordinarie meanes, as are both meete and necessarie, both to distinguish diuerse seasons of the yeere, & to ryphen things that are most requisite for the maintenaunce of men, in which respect, the Greeke poet Aristophner called Astronomie . . . the diuine or heauenlie science.

(Howard, sig. N. iiiiv)

Howard objects to astrology because it misapplies mathematics to the study of planetary motions (sig. q.i.); because it violates the concept of a natural law by failing to demonstrate that similar causes (comets,

for instance) always lead to like consequences; and because it purports to be based on simple rules of proportion, but these rules cannot be proved "profitable, lawfull, true and agreeable to nature" (Howard, sig. S. i.^v). Indeed, says Howard, he has seen one of the basic tenets of astrology--that a woman prince is especially susceptible to the influence of comets--disproved by a simple experiment. Howard saw Queen Elizabeth go to a window and observe the comet "which appeared last" (in 1580). Against the advice of her counselors, she threw open the window saying, "Iacta est alta, the dyce are throwne," and placed herself at the mercy of the comet. And, Howard crows, nothing has happened as a result: "That the Comets hinder not the lyves of Princes, I haue prooued . . ." (Howard, sig. V. iiii).

Subsequent to his arguments based upon a demand for sound scientific practices, and his demonstration from experience that astrological tenets are wrong, Howard attacks the almanac writers and prognosticators, particularly those who predict the Second Coming, and chastises them for arousing and terrifying the public. Despite his sensible reasoning, Howard's Defensatiue helped land him in the Fleet for four years. Howard, who was a crypto-Catholic, had intrigued with Mary Queen of Scots against Elizabeth. He was arrested in 1583, the year he published his book; and whether his book served as a stalking-horse for those already convinced of his treason, or whether it was considered genuinely dangerous, it was declared heretical.⁸⁸

The public thus found itself discouraged from reading Howard, and by implication, the works of the prognosticators were approved. The care for accuracy called for by Howard was held in less favor than the

procedures of the doomsday writers. The traditional role of the mathematician as both astronomer and astrologer was therefore not seriously challenged prior to the year 1587; nor was the tendency of prognosticators to link predictions of the Second Coming with observations and procedures derivative of practical mathematics.

Contemporary accounts testify to the popular fears engendered by the doomsday tracts written in the 1580s.⁸⁹ But this fear is not simply an example of ignorant credulity. The same scientific principles or formats which brought rapid technological advances to England between 1553 and 1587 seemed to be legitimately applied to predictions of the Second Coming. We need only consider how closely allied with one another were the practices of astrology and astronomy, number magic and practical mathematics to understand why one field gained legitimacy from the other. John Dee, whom Elizabeth called "hyr philosopher," gave technical advice to overseas explorations, seriously pursued the Occult Arts, and proved that the immutable heavens had undergone a change. Robert Recorde, who had published the first vernacular mathematics texts and dedicated one of them to the Muscovy Company, argued that astrology was the most important application to be made of astronomical information. Thomas Digges, who had been Dee's student and ward, helped Leicester prepare England's land defenses against the Spanish, published a widely read prognostication which included the first English translation of Copernicus, and called the supernova of 1572 a portent sent by God. Dee, Thomas Digges, Robert Norman and others advocated an inductive method of inquiry into natural phenomena, and Rogers and Harvey seemed to do likewise. Recorde, Dee and Thomas Digges recommended

Plato to their readers, and Rogers and Harvey again concurred. Howard, who is mistrustful of Plato and an advocate of Aristotle, was sent to prison for treason and heresy shortly after he published a book condemning astrology.

Although science and pseudo-science were accommodated under the same umbrella, they gave rise to divergent attitudes about the future of society. The mathematical and technical manuals which dealt with practical science promoted an optimistic view by suggesting that the study of natural phenomena combined with cooperative efforts between courtier and businessman, scientist and craftsman, opened opportunities for advancement to both the individual and the nation. The tracts linking number-magic with predictions of the Second Coming promoted a pessimistic view of the future, depicting a decayed world and a degenerate society impelled towards imminent extinction. The advocates of the new science suggested that natural laws were comprehensible and an understanding of them would lead to useful technical advances. The doomsday writers suggested that natural laws were predictable, and emphasized their domination over man. The double application of mathematics--to mensuration and observation and to the manipulation of numbers as magic symbols--led to opposite views of the human condition. Both derived from Christianized Platonism, but one suggested that man could gain dominance over his environment, the other that man was an instrument of Providence. From the advocacy of mathematics as the key to nature's secrets came support for both a belief in the heroic proportions of man and a recognition of his absolute subordination to a predetermined historical process.

We began this survey of the attitudes fostered by science in the 1580s by considering what kinds of interests some members of Marlowe's audience might have had, and what books they were reading. The young man fired by exploits of Drake, Hawkins, Gilbert, and Raleigh; or anxious that his patrimony be accurately surveyed; or preparing to pursue a military career; or searching for a lucrative trade would have encountered manuals informing him of the need to acquire a knowledge of mathematics, and promising him wealth and recognition if he did so. In the same bookstalls he would have read mathematically demonstrable predictions of the world's imminent demise, and he would have found that those who wrote the textbooks and manuals offering information on mathematics were cited as authorities by those who wrote the doomsday tracts. At the theatre he would have seen on different days the two parts of Tamburlaine. He would have seen an aggressive figure who described himself as possessed of a soul striving after "knowledge infinite," and who marched across the newly charted topography of the East, gained by his martial prowess the Empire and the Woman. He would hear Tamburlaine declare that it was "Nature" which led him to these victories. At the same time, our young man would have heard Tamburlaine describe himself as one whose destiny was determined by the stars and whose identity as Scourge was imposed upon him as part of Providential design.

The correspondences between the attitudes fostered by those interested in mathematics and the moods presented in Marlowe's Tamburlaine suggest that the popular attitudes towards science will help us better appreciate the unifying principles of Marlowe's play. Since

the oscillating vision of Tamburlaine as self-willed and predestined forms the dramatic pattern, we hope to find in the study of scientific influences a locus for the intellectual tensions which shaped Tamburlaine.

Notes

¹In the Times Literary Supplement, 29 (28 August, 1930), p. 683, Sir Edmund Chambers published a letter from Philip Gawdy (1562-1617) to his father on 16 November, 1587:

"My L. Admyrall his men and players having a devyse in theyr play to tye one of their fellowes to a poste and so to shoote him to deathe, having borrowed their Callyvers one of the players handes swerved his peece being charged with bullett missed the fellowe he aymed at and killed a chyld, and a woman great with chyld forthwith, and hurt an other man in the head very soore."

Chambers argued that this scene is the execution of the Governor of Babylon in 2 Tamburlaine, act V. As Bakeless observes, this does not exactly describe the scene as we now have it:

"Tamburlaine directs that the unfortunate governor shall be hanged from the city walls and there shot to death. Nothing is said about tying him to a stake. Gawdy, however, says specifically that he did not actually see the incident: 'though my self no wytnesse thereof, yet I may be bold to veryfy it for an assured trothe.' Hence it is possible to assume that the scene on the stage accorded exactly with the text, and was merely garbled by word-of-mouth accounts."

See John Bakeless, The Tragical History of Christopher Marlowe, I, 2nd ed. (1942; rpt. Westport, Connecticut: Greenwood Press, 1970), p. 199.

²The first discussion of *Ive* was offered by F.-C. Danchin, "Études critiques sur Christopher Marlowe," Revue germanique, 8 (January-February, 1912), pp. 23-33.

³Bakeless offers a list of dates assigned by Marlowe's editors and critics between the years 1826 and 1936 (vol. I, pp. 200-01, f.n.); for other discussions of dating see Una-Ellis Fermor, Christopher Marlowe, 2nd edition (1927; rpt. Hamden, Connecticut: Archon Books, 1967), p. 3; Frederick Boas, Christopher Marlowe: A Biographical and Critical Study, rev. ed. (1940; rev. Oxford: Clarendon Press, 1953), p. 73; Kocher, p. 28; Godshalk, pp. 23ff.

⁴Ribner, ed., Complete Plays, 2 Tamb., Prologue, 1-3. All subsequent quotations are from this edition.

⁵Eleanor Rosenberg, Leicester: Patron of Letters (New York: Columbia University Press, 1955), pp. 3-19; Hill, p. 28.

⁶Robert Lacey, Sir Walter Raleigh (New York: Atheneum, 1974), p. 73; L. C. Knights, Drama and Society in the Age of Jonson (London: Chatto and Windas, 1937), pp. 65-69.

⁷Samuel Eliot Morison, The European Discovery of America: The Northern Voyages, a.d. 500-1600 (New York: Oxford University Press, 1971), p. 516; Knights, pp. 47-50.

⁸Antonia McLean, Humanism and the Rise of Science in Tudor England (New York: Neale Watson Academic Publications, 1972), pp. 124-25; E. G. R. Taylor, ed., A Regiment for the Sea and other Writings on Navigation by William Bourne (Cambridge: for the Hakluyt Society, 1963), pp. xv-xvi; Hill, p. 16.

⁹Taylor, Regiment, p. xv.

¹⁰Albert Hastings Markham, ed., The Voyages and Works of John Davis the Navigator (London: for the Hakluyt Society, 1933), p. 236. Cited hereafter as Davis.

¹¹See also D. W. Waters, p. 30.

¹²E. G. R. Taylor, Math. Pract., p. 41.

¹³McLean, p. 236; Hill, p. 16; Francis Johnson, pp. 3-13.

¹⁴Hill, p. 21.

¹⁵Quoted in Taylor, Math. Pract., p. 42.

¹⁶William Bourne, A Regiment for the Sea (London: Thomas Hacket, 1574). Reprinted in Taylor, Regiment; see also Taylor, Math. Pract., p. 322; Hill, p. 21.

¹⁷See Johnson, p. 141; Taylor, Math. Pract., p. 318.

¹⁸Taylor, Math. Pract., p. 39.

¹⁹See Johnson, p. 175-76; Taylor, Math. Pract., p. 320.

²⁰See Francis R. Johnson and Sanford V. Larkey, "Thomas Digges, the Copernican System, and the Idea of the Universe in 1576," The Huntington Library Bulletin (April, 1934), p. 76. This article reprints Digges' treatise in facsimile. All subsequent citations are to this reprint.

²¹See Hill, p. 17.

²²Johnson, p. 132.

²³Taylor, Math. Pract., p. 167.

²⁴Johnson, p. 134.

²⁵Johnson, pp. 127-28.

²⁶Unnumbered. Last page of preface to the reader.

²⁷Source: Oxford English Dictionary.

²⁸For a discussion of the Archmaster as Magus see Hiram Haydn, The Counter-Renaissance (New York: Harcourt, Brace, & World, 1950), pp. 193-94; Yates, pp. 148ff.

²⁹See Yates, pp. 144-56; Haydn, pp. 177, 179, 201.

³⁰Quoted in Taylor, Math. Pract., p. 320. Taylor's translation.

³¹Johnson, p. 140.

³²John Webster, Academiarum Examen (1654). Cited in John French, The World of an Elizabethan Magus (London: Routledge, Keagan, Paul, 1972), p. 176.

³³J. Crosseley, ed., The Diary and Correspondence of Dr. John Worthington, 1655 (Chetham Society, 1847), I, p. 59. Cited in French, p. 175.

³⁴John Williams Burgon, The Life and Times of Sir Thomas Gresham, Vol. I (London: Effingham Wilson, 1839), pp. 233, 257-262; William Robert Scott, The Constitution and Finance of English, Scottish, and Irish Joint Stock Companies to 1720, Vol. 1 (Cambridge University Press, 1912), pp. 23-25; Waters, p. 100.

³⁵See Waters, p. 197.

³⁶Waters, p. 61; E. G. R. Taylor, Tudor Geography, 1485-1583 (London: Methuen & Co., 1930), pp. 89-90.

³⁷From letter about John Cabot's aim written by Raimonde de Sorcino to the Duke of Milan, 18 Dec., 1497. From Archives of Milan. Quoted in Waters, p. 86; printed in J. A. Williamson, The Voyages of the Cabots (1929).

³⁸Taylor, Tudor Geography, p. 77.

³⁹Taylor, pp. 99-100.

⁴⁰Richard Deacon, John Dee: Scientist, Geographer, Astrologer, and Secret Agent to Elizabeth I (London: Frederick Muller, Ltd., 1968), p. 98; Taylor, Tudor Geography, pp. 122-23.

⁴¹Taylor, Tudor Geography, pp. 99, 106.

⁴²Taylor, p. 106; Waters, p. 210, f.n.; Deacon, pp. 92-98.

⁴³Taylor, Tudor Geography, pp. 116-18.

⁴⁴Waters, pp. 209-12.

⁴⁵Waters, pp. 525-26.

⁴⁶Waters, pp. 190-91.

⁴⁷Waters, pp. 373, 584-85; Taylor, Math. Pract., pp. 183, 326; John V. Pepper, "Harriot's Earlier Work on Mathematical Navigation: Theory and Practice," in Thomas Harriot, Renaissance Scientist, ed. John W. Shirley (Oxford: Clarendon Press, 1974), pp. 54ff.

⁴⁸For this discussion of the relationship between Elizabethan economic and foreign policy and developments in navigation I am particularly indebted to Waters, The Art of Navigation. See especially Waters, pp. 197ff.

⁴⁹Waters, p. 192; Taylor, Math. Pract., pp. 178, 322.

⁵⁰Waters, p. 194.

⁵¹Quoted in Waters, p. 220.

⁵²Waters, pp. 121-22.

⁵³W. S. Kals, Practical Navigation (New York: Doubleday & Co., 1972), p. 3; Waters, p. 122.

⁵⁴Waters, p. 373.

⁵⁵Waters, pp. 119-20.

⁵⁶Taylor, Regiment, p. xxix.

⁵⁷Rosenberg, pp. 283, 286-87; Waters, pp. 144, 149-150.

⁵⁸Taylor, Math. Pract., pp. 171, 319; Waters, pp. 106-07.

⁵⁹Waters, p. 101; William Cunningham, Growth of English Industry and Commerce I (Cambridge University Press, 1890-92), pp. 63-64, 69; James Alexander Williamson, A Short History of British Expansion (London: Macmillan and Co., Ltd., 1922), p. 51.

⁶⁰Waters, p. 243.

⁶¹Waters, p. 243. Waters suggests the connection between Gilbert's petition and Gresham's will.

⁶²See Burgon, Vols. I and II, passim.

⁶³Waters, p. 243.

⁶⁴In "Epistle Dedicatorie," to "The Right Worshipfull and Most Vertuous Gentleman Master Phillip Sydney, Esquire," Richard Hakluyt Divers Voyages (Hak. Soc., Ser. I, Vol. 7). Extract in Waters, p. 542.

⁶⁵S. P. 12/170. No. 1. Reprinted in Waters, p. 544.

⁶⁶There is some disagreement over the dates for the Hood Lectures. Taylor (Math. Pract.) says the lectures were discontinued "after four years or so" (p. 179); Johnson (Astronomical Thought) says the lectures may have continued for more than four years, but "had definitely been abandoned before 1596" (p. 205); Waters says it is "more likely" that they ended in 1598 (p. 201, f.n.).

⁶⁷John Maynard Keynes, A Treatise on Money (New York: Harcourt, Brace, and Co., 1930). "The booty brought back by Drake in the Golden Hind may fairly be considered the fountain and origin of British Foreign investment" p. 156; see also p. 157.

⁶⁸Waters, pp. 96, 212.

⁶⁹C. Camden, Jr., "Elizabethan Almanacs and Prognostications," The Library, Fourth Series, XII (June, 1931), pp. 97-98.

⁷⁰Camden, p. 84; see also Eustace F. Bosanquet, English Printed Almanacs and Prognostications: A Bibliographical History to the Year 1600 (London: Chiswick Press, 1917), p. 12; and H. R. Plomer, "A Catalogue of English Almanacks of the Sixteenth Century, with Bibliographical Notes," N & Q Sixth Series, XI and XII.

⁷¹Camden, pp. 93-94.

⁷²Bourne attached rules for navigation to his Almanacke for Three Years (1571). See Taylor, A Regiment, pp. 8, 55.

⁷³See Harris, p. 94; see also Ernest Lee Tuveson, Millenium and Utopia (Berkeley and Los Angeles: University of California Press, 1949), pp. 43, 51.

⁷⁴Tuveson, p. 22.

⁷⁵Tuveson, pp. 14ff; Harris, pp. 86-92; see also Don Cameron Allen, "The Degeneration of Man and Renaissance Pessimism," SP, XXXV (1938), pp. 202-27; and George Williamson, "Mutability, Decay and Seventeenth Century Melancholy," ELH, II (1935), pp. 121-50.

⁷⁶Johnson, p. 154.

⁷⁷Sir Henry Ellis, et al., eds. Holinshed's Chronicles of England, Scotland, and Ireland, IV (London: for J. Johnson, et al., 1808; rpt. New York: AMS Press, 1965), p. 320.

⁷⁸Digges, Alae, sigs. A2, L3; quoted in Paul H. Kocher, Science and Religion in Elizabethan England (San Marino, Calif.: The Huntington Library, 1953), pp. 175-76.

⁷⁹Unnumbered, p. 1.

⁸⁰"Epistle to Demetrianus." For a discussion of the sorrows of St. Cyprian, see Tuveson, pp. 13-14.

⁸¹Alae, sig. 2 A^v. Johnson's translation in Johnson, p. 159.

⁸²Tuveson, pp. 45, 226 f.n.; see also Sarah Dodson, "Holinshed's Sources for the Prognostications about the Years 1583 and 1588," ISIS, XXXVIII (1947), p. 60; C. Camden, Jr., "English Almanacs and Prognostications," The Library, Fourth Series, XII (Sept. 1931), pp. 196-99.

⁸³Bosanquet, pp. 41, 43. Buckmaster or Buckminster held a Master of Arts, though we do not know from which university.

⁸⁴Camden, "Eliz. Almanacs" (Sept., 1931), pp. 196-99.

⁸⁵Camden, "Eliz. Almanacs," p. 197 and f.n.; Johnson, p. 312.

⁸⁶Camden, p. 199.

⁸⁷It is difficult to find anyone who thinks highly of Howard. A. L. Rowse's comments are typical: "A crypto-everything by nature, crypto-papist, he was also a crypto-homosexual; that gave him a bond with James I, with whom he was in high favour and whose mind he sedulously poisoned, in Elizabeth's last years, against Raleigh." In A. L. Rowse, Sir Walter Raleigh, His Family and Private Life (New York: Harper & Brothers, 1962), p. 101; see Camden, "Eliz. Almanacs" (Sept. 1931), pp. 198-99.

⁸⁸Camden, pp. 198-99. Howard had been arrested twice before on charges of conspiring with Mary Queen of Scots, once in 1572, once in 1582. Upon his release in 1582, he composed his Defensatiue, which may have been occasioned by Richard Harvey's prognostication. He was arrested immediately after its publication in 1583. "The book . . . was suspected of 'seeming heresies' and of treason, 'though somewhat closely covered' (Styrpe, Grindal, p. 157)." See D.N.B., p. 29. The D.N.B., though acknowledging Howard's unprincipled character, says he "was reputed to be the most learned nobleman of his time," p. 32.

⁸⁹See John Chamber, A Treatise Against Judiciall Astrologie (London, 1601), p. 43; and Camden, "Eliz. Almanacs," (Sept. 1931), p. 200.

CHAPTER 3

As we have noticed, there is a lack of consensus among critics who have studied Christopher Marlowe's Tamburlaine the Great. The play has been variously read as either a bold attempt on Marlowe's part to chart new frontiers for the human spirit, or as Marlowe's brief for the conservative Elizabethan morality. Marlovian criticism generally falls into one or the other of these camps, and the debate has become so heated that Godshalk in his recent study descends to polite name-calling when he reviews these critical studies, chastising those who assume Marlowe is "a propagandist for Renaissance aspiration, a purveyor of Elizabethan confidence, and for whom the Playwright is a kind of pre-Romantic, perhaps an Elizabethan Keats." Those critics who like Godshalk try to see Marlowe in a true "Renaissance . . . context" he congratulates as "common sense critics."¹

The difficulty in defining the relationship between Tamburlaine and its age arises from the play's tendency to oscillate between moods of expansiveness and constraint. Harry Levin defines this pattern as "Icarian" since "it encompasses both the limitless aspiration and the limiting consequence: both infinitude and fragmentation."² Molly Mahood also discerns a polarity and characterizes the dramatic rhythm as a movement "between the extremes of rationalism and fatalism."³ Levin and Mahood are unusual in their efforts to accommodate the dramatic polarity of Tamburlaine. While other Marlovian critics would agree with them that the play contains elements supportive of both an expansive and

proscriptive view of the human potential, they tend to dismiss one or the other of these characteristics as an accidental rather than an essential quality of the play.

The critical school Godshalk and others designate as Romantic is sympathetically inclined towards those aspects of the play which depict Tamburlaine's spiritual expansiveness. One such critic, Una Ellis-Fermor, assumes the play is damaged by Marlowe's ambivalence towards the heady and rebellious ideas he sought to articulate. For this reason, she dismisses 2Tamburlaine as an interpretative failure because it "contains the Nemesis whose very existence it was the triumph of the first part to deny":

The Tamburlaine of the second part of the play is marked by a savageness, an ever-increasing extravagance, a lack at once of inspiration and of balance. The freakish, unrestrained moods of these later scenes have little or nothing to do with the glittering figure of the earlier part who spoke of the destiny of man. . . . These later qualities are the logical outcome of the situation that Marlowe created when he set out to write a 'second part' to the study of a character who can, by the very nature of his being, only have a first part. For Tamburlaine lives in the future, and the essence of his spirit is the forward reach. . . . There are certain instincts and desires at work in the mind that are so wholly things of the spirit that to pursue them in realization and fulfilment is not within the power of human thought, not even for Christopher Marlowe.⁴

Ellis-Fermor assumes Marlowe proves inadequate to his vision because he dilutes his portrait of limitless aspiration with elements of limiting consequence.

Roy W. Battenhouse answers Ellis-Fermor by arguing that her sense of Marlowe's inadequacies results from her failure to properly understand the Renaissance attitude regarding ambition:

Ambition, plainly, is the central theme of Tamburlaine. Why, then, may we not regard Marlowe's play as a moralized history after the pattern of the Mirror for Magistrates? Does not Tamburlaine share the typical concern of Renaissance tragedy: the theme of man's faulty passions and God's just providence? . . . I should like to make it possible for us to decide between two alternative views regarding Marlowe's purpose in writing tragedy. One view, that adopted by our modern critics, makes Marlowe's plays fit a nineteenth-century notion of tragedy, in which heroes are tragic only because their reach exceeds their grasp. . . . The second view, the typical Renaissance notion of tragedy, is that tragedy deals with the fall (not the falling short) of men, and that the tragic fall is both a consequence and a punishment of sin. The art form of drama, in seeking to mirror this tragedy, has a didactic purpose: it seeks to instruct men in self-knowledge and to lead them to moral amendment.⁵

Battenhouse assumes that the play is not designed to inspire admiration for Tamburlaine; rather, the play deals exclusively with limiting consequence, and those critics who admire Tamburlaine's limitless aspiration are misreading the play.

Both Battenhouse and Ellis-Fermor would dismiss Levin's perception of an Icarian pattern. Although Ellis-Fermor elsewhere describes Marlowe's dramatic development as a movement from Elizabethan optimism to Jacobean pessimism, her treatment of Tamburlaine leaves no room for Levin's assumption that the play encompasses a double view of the human condition. Battenhouse would obviously object to Levin because the Icarian pattern supposes that the tragedy lies in man's "falling short," not in the Fortunate Fall. Yet by failing to acknowledge the play's polarity, the movement between "infinitude and fragmentation," Ellis-Fermor and Battenhouse are obliged to qualify the play with certain intellectual hedges. Ellis-Fermor dismisses all of 2 Tamburlaine as a betrayal of Marlowe's artistic vision precisely

because it deals more with Tamburlaine's frustration than with his success. And Battenhouse characteristically ignores the impact of the language. The forcefulness of Marlowe's "mighty line," its appeal to restlessness, aspiration, and aggressive individualism, he regards as extrinsic to the meaning of the play.

The intellectual hedges erected by Ellis-Fermor and Battenhouse are a necessary consequence of their preconceptions about Marlowe's period. Battenhouse assumes the Elizabethan age was one in which stability, order, and hierarchy were prized above all other values, and argues that Tamburlaine can be properly appreciated only when it is read in this context. Ellis-Fermor also views the Elizabethan period as essentially conservative, and argues that Marlowe was a lone figure endeavoring to break through the confines of his age. She feels Tamburlaine was for Marlowe "a poem of escape." Marlowe takes for his subject "all that is farthest from the calm intellectual regularity of academic life," and his poetry is "the poetry of imagination at last released and making its dreams in defiance of fact" (Ellis-Fermor, p. 25). Thus while Battenhouse argues that Marlowe is holding up the mirror of nature to his audience by showing them the rewards of sinful ambition, Ellis-Fermor assumes that Marlowe's work is fantasy because he presents a positive picture of ambition "in defiance of fact."

This consensus about the nature of the Elizabethan period is typical of Marlovian criticism. Critics may disagree as to whether Marlowe was in rebellion with his age or an apologist for it, but there is general agreement that he had to be one or the other.⁶ The assumption is that the Elizabethan age was one of consensus, and a breakdown in

accepted values did not occur until after Elizabeth's death. Given such assumptions, it is difficult to argue that the ambiguity in Tamburlaine --the oscillation between expansiveness and constraint--is an essential rather than an accidental feature of the play, and that it represents Marlowe's effort to paint a dispassionate portrait of his age. For this reason, Marlovian criticism has failed generally, despite the efforts of Levin and Mahood, to account for the tensions in Tamburlaine in a way that gives credit to the integrity of Marlowe's artistic design.

Nonetheless, it is obvious that the attitudes fostered by Elizabethan science during the 1580s do not fit these historical preconceptions. Scientific activity gave rise to assumptions about the human condition which were at best inconclusive. It was possible during this period for someone skilled in mathematics to agree that the use of new technical skills promised an attractive future for both the commonwealth and the individual, while recognizing that the doomsday predictions drew upon the same theoretical resources as did the new technology. An awareness of the contradictory views generated by Elizabethan science offers a promising context for examining Tamburlaine. The oscillation between moods of expansiveness and constraint is presented in the play through images associating Tamburlaine on the one hand with concepts of infinite extension and on the other with astrological fatalism. Since the concept of spatial infinity was an emergent one during the period, and since judicial astrology was used to predict the imminent end of the world, an understanding of the scientific theories underlying the conceptions of infinity and astrological determinism provide a means for elucidating the play's structure and meaning.

Although the biographical documents link Marlowe with Thomas Hariot and tangentially with Sir Walter Raleigh, Tamburlaine has not been intensively examined in terms of the Elizabethan scientific background and its practical connections with plans for imperialist expansion. Even granting the unreliability of the biographical data, this is a serious omission since the repeated references to infinity, astrological determinism, aspiration, and imperialism--taken along with the biographical documents--serve as compelling reasons for examining Marlowe's awareness of developments in Elizabethan science. But perhaps the most compelling reason for such an examination is that these scientific contexts provide a way of reassessing Marlowe's relationship to his age, and remove the necessity for evaluating Marlowe as either a subjective, ambivalent artist in rebellion with his age, or as a moral apologist for Elizabethan orthodoxy. By assuming that Tamburlaine has as its essential feature an ambiguous presentation of ideas, it is possible to account for the modern response to the play without resort to the intellectual hedges that Marlowe was either a failed Romantic, or a didacticist whose lessons can no longer be appreciated by modern audiences too enamored of the values of individualism.

I

One of the toughest nuts for critics to crack when they come to Tamburlaine is the meaning or implications of the crown speech. The

chief difficulty is in deciding whether to take seriously Tamburlaine's assertion that the object of human endeavor is "the sweet fruition of an earthly crown." The problem would be easier of resolution if the speech were not embedeed in a context suggesting the infinite yearnings of the soul, since the religious or spiritual connotation makes the crown seem an unworthy goal. This evident mixing of diction struck Havelock Ellis as a significant flaw in the speech. He praises the character Tamburlaine as "a divinely strong and eager-hearted poet,"⁷ and assumes the motivating force behind Tamburlaine's action is his vision of "an unattainable loveliness beckoning him across the world" (Ellis, p. xxxiv). These facets of Tamburlaine's character are for Ellis embodied in a portion of the crown speech:

Our souls, whose faculties can comprehend
The wondrous architecture of the world,
And measure every wandering planet's course,
Still climbing after knowledge infinite,
And always moving as the restless spheres,
Wills us to wear ourselves, and never rest,
Until we reach the ripest fruit of all. . . .

But Ellis will go no further than praising the line ending "the ripest fruit of all." The concluding line, "the sweet fruition of an earthly crown," Ellis dismisses as "Scythian bathos" (Ellis, p. xxxv).

The implication that the last line of the speech represents a failure of both diction and idea is made explicit by Ellis-Fermor who consistent with her general treatment of Marlowe, finds the line a signal example of Marlowe's artistic failure:

the fact is that Marlowe has suddenly--it may be all unconsciously--broken faith with his idea. The instinct is there, magically defined and passionate. The error, the inability to grasp in a weaker mood its full significance, occurs when Marlowe attempts to give it

a special direction. . . . Yet the fundamental idea, that man can, if he will, reach the sublime, that what has never been accomplished is not therefore impossible, remains unshaken to the end.

(Ellis-Fermor, p. 29)

As we might expect, Battenhouse is particularly irritated with this line of argument. He is moved by Ellis-Fermor's observations to comment: "Miss Ellis-Fermor's dilemma has resulted because, unable to stomach the frank worldliness of Tamburlaine's ambition, she nevertheless wants to admire Tamburlaine's 'spirit.' Her criticism fails, because she has studied the drama not with the eyes of an Elizabethan, to whom ambition was sin, but with the eyes of a modern, to whom upward striving is noble" (Battenhouse, p. 3). Battenhouse in his turn has been criticized by J. B. Steane for his one-sided characterization of the play and its intended audience:

One of the basic flaws of Battenhouse's argument can be seen in his stricture on the criticism of Ellis-Fermor. We must look at the play "with the eyes of an Elizabethan." This seems reasonable until you ask what sort of Elizabethan, for this "an" with all its innocent singularity is wonderfully inclusive. The answer comes "an Elizabethan to whom ambition was sin": so this attribute of "most" Elizabethans is, by the deftly inclusive "an," transferred to all. The assumption is that Marlowe wishes you to watch the play with a conventional mind because he is giving something which will fortify you in your conventionality. That such an assumption is at odds with the excitement and thrust of the poetry does not appear to bother or even occur to the writer, who is involved in a kind of scholarly detection and litigation and not directly concerned with poetry.⁸

Thus the issue is joined, and the controversy presents in small the larger critical debate over Marlowe's relationship to his age. In one camp are those critics who are sympathetic towards the presentation of the aspiring hero restlessly seeking self-fulfillment. They are

appreciative of Marlowe's poetic power but feel he was ambivalent regarding his own novel ideas. Steane, for example, goes on to argue that the crown would have struck Marlowe's audience as an apt image since it "was a more imposing symbol in Tudor times than it is today" (Steane, p. 79). Nonetheless, Steane feels that the spirit and vitality of Marlowe's poetry is not matched with a similarly satisfying moral outlook. Tamburlaine's spirit, though attractive, is manifested in cruel ways and Steane concludes from this that Marlowe's mind was divided: "A particular combination of evils is justified and even gloried in though opposed fitfully by the misgivings, revulsions or positive assertion of normal moral judgement" (Steane, pp. 111-12). Similarly, Michel Poirier argues that the mixed diction of the crown speech is significant because it "bears on the disproportion between Marlowe's thirst for the infinite and the character he has chosen as his mouthpiece." The barbaric Tamburlaine is not an apt vehicle to express Marlowe's spiritual yearning for "infinite knowledge" and "infinite beauty," and while this is "a serious blow at the consistency of the character," it is "a valuable means of throwing light upon Marlowe's soul."⁹ Similarly Kocher, who feels that in the crown speech Tamburlaine "speaks like a prior incarnation of Nietzsche" (Kocher, p. 72), argues that Marlowe's diction reflects his own yearnings. Marlowe like all his heroes craves power, although such ambitions "were, of course, anathema to the Elizabethan moral code" (Kocher, p. 6).

The assessments offered by Steane, Poirier, and Kocher reflect the subjective assumptions about Marlowe's drama that Ellis-Fermor can be said to have fostered. In the other camp are those critics who

follow Battenhouse in their argument that Marlowe was an apologist for the conservative values of his age. These critics tend to interpret the crown speech as intentionally ironic. Godshalk argues that the speech has the effect of "undercutting Tamburlaine's excessive materialism" (Godshalk, p. 133). Elizabethan audiences would have understood the irony since "few Renaissance men would have admitted that the highest achievement of their inmost nature, the faculties of the soul, could be the attaining of an earthly crown" (Godshalk, pp. 133-34). Douglas Cole, like Battenhouse and Godshalk, is impatient with those critics who characterize material ambition as "the burning thirst of Marlowe himself."¹⁰ Cole argues that "Marlowe stresses above all the human habit of cloaking these manifestations of disorder and perversity in eloquently expressed 'ideals' and high sounding language," and feels Marlowe's aim is to reveal the "illusory aura of nobility with which man persistently invests his base desires" (Cole, p. 263). Masinton also argues that Marlowe's use of language in the crown speech and elsewhere gives the lie to Tamburlaine's professed nobility. Masinton assumes Elizabethan audiences would have recognized the irony of the crown speech because "rebellion was considered a heinous crime and a grave sin in Elizabethan England, and thus Tamburlaine unconsciously condemns himself in the speech."¹¹

It is obvious from these studies that Havelock Ellis hit a critical nerve when he expressed his uneasiness over the mixed diction of the speech. Tamburlaine's combining of a sublime description of the soul's restless aspirations with the ridiculous praise of wealth and power strikes students of the play as a unique, not to say bizarre,

concoction. For this reason, they feel obligated to qualify its meaning, either by assuming it mirrors Marlowe's own desires, however confusedly stated, or by explicating its ironies. One reason for this tendency is the assumption that Tamburlaine's linking of intellectual and spiritual aspiration with the desire for wealth and power is a singular example; that is, few models of Elizabethan prose or poetry have been brought forward as possible analogues to it.

The studies of Harry Levin and Eleanor Grace Clark are exceptional in this regard.. They both deal briefly with works by authors close to court circles who wrote in support of Elizabethan imperialist schemes. Levin mentions the "blank verse and the imperial theme" employed by Greene, Lodge, and Peele, and observes "how strategically these theatrical works were allied to the naval heroes of the day" (Levin, Overreacher, p. 56). Levin quotes Peele's "Farewell to Norris and Drake" as a particularly telling instance of this tendency (Levin, Overreacher, p. 56), while Eleanor Grace Clark, who is interested in Raleigh's colonizing efforts, offers "To the Virginia Voyage" as evidence of Daayton's efforts on Raleigh's behalf.¹²

Although the examples offered by Levin and Clark indicate that poets other than Marlowe endeavored to invest the pursuit of wealth and power with a heroic sanctity, the authors they mention wrote too late to have influenced Tamburlaine; however, Greene, Lodge, Peele, and Drayton were preceded in their efforts by poets of lesser note. Several particularly interesting examples appeared in 1583 appended to Sir George Peckham's A True Reporte,¹³ which is an account of the discoveries made by Sir Humfrey Gilbert on his fatal voyage to the new world. The

book seeks to establish England's claim to this land, and was undoubtedly published at the urging of Raleigh as part of his efforts to stimulate interest in his colonizing plans. The poems appended to the volume are particularly interesting, not only because they deal with the imperial theme in heroic terms, but because they invest the pursuit of material wealth with a kind of spiritual sanctity. For this reason, they provide an insight into the rhetorical models available to Marlowe when he turned his attention to these ideas.

The poems all make similar appeals, although the emphasis naturally varies. The poets argue that God sanctions voyages of overseas discovery and the expansionist dreams which inspire them. Moreover, the poets repeatedly remind the reader that it is natural for man to seek new horizons, and offer the promise of gold as one of the more attractive rewards for channeling human restlessness into overseas exploration. Sir William Pelham's poem gives the greatest attention to these natural longings:

Like as the Fishes, breeding in the deepe,
Through all the Ocean are allowed to raung;
Nor forst in any certaine boundes to keepe,
But as their motions carry them to chaung.
To men like libertie, dooth reason give:
In choise of soile, through all the world to live.
(Peckham, p. 437)

Pelham goes on to argue that this natural restlessness leads courageous men to carve out a place amenable to their needs:

To valiaunt mindes each land is a native soile,
and vertue findes no dwelling place amis,
Regard of honour measures not the toyle,
To seeke a seat wherein contentment is,
That seat, that soile, that dwelling place of rest:
In this discourse, most livelie is exprest.
(Peckham, p. 437)

Pelham presents the notion that men are carried naturally "to chaung," and have the "libertie" to decide where it is they want to live. Men of particular valour and honor will decide to exercise their liberty in carving out a colony in the wilds of the new world. For Pelham, then, the object of man's natural restlessness and search for honor is an estate in America.

A similar note is sounded in the poem by Captaine Bingham, who is no less eager than Pelham to link the restlessness of the spirit with the desire for honor, and is even more willing than Pelham to connect it with material reward and martial adventure:

If honour and reward, may moove the minds,
By noble actions, highlie to aspire:
The forward man in this discourse shall finde,
Reward and honour, propos'd for hire.
Whiche meede, no right renowned hart mislikes:
Though gained by passing through ten thousand pikes.
(Peckham, p. 439)

Bingham unashamedly asserts that aspiration for noble action can find its best fruition in the search for profit and fame in America. In his last stanza, moreover, he chides those who do not pursue the dream of America:

Then launch ye noble youthes into the maine,
No lurking perrils lye amidde the way:
Your travell shall retourne you treble gaine,
and make your names renowned another day.
For valiaunt mindes, through twentie seas will roome:
And fish for lucke, while sluggardes lye at home.
(Peckham, p. 439)

Pelham and Bingham emphasize the honor that will accrue to the restless, ambitious young man who adventures to America. They emphasize as well the temptations of wealth, but not to the same extent as other contributors. Not surprisingly, Sir Francis Drake's offering gives the

most sustained attention to this aspect of the colonizing ventures:

Who seekes, by worthie deedes, to gaine renowne for
 hire:
 Whose hart, whose hand, whose purse is prest: to purchase
 his desire
 If anie such there bee, that thirsteth after Fame:
 Lo, heere a meane, to winne himselfe an everlasting name.
 Who seekes, by gaine and wealth, t'advauce his house
 and blood:
 Whose care is great, whose toile no lesse, whose hope, is
 all for good
 If anie one there bee, that covettes such a trade:
 Lo, heere the plot for common wea(l)th, and private gaine
 is made.
 Hee, that for vertues sake, will venture farre and neere:
 Whose zeale is strong, whose practise trueth, whose faith
 is void of feere,
 If any such there bee, inflamed with holie care.
 Heere may hee finde, a readie meane, his purpose to declare:
 So that, for each degree, this Treatise dooth unfolde:
 The path to Fame, the prooffe of Zeale, and way to
 purchase golde.

(Peckham, p. 438)

Despite the ruggedness of rhythm, Drake's poem comes closer than the others to capturing the spirit found in the crown speech. Like that speech, the poem refers to virtues normally associated with spiritual impulses--"trueth," "faith," "holie care"--and then argues that these virtues should be directed towards a material end: "The pathe to Fame, the prooffe of zeale, and way to purchase golde." But all the poems participate in this spirit, whether they emphasize the restless nature of ambitious men, the honor and glory that come to those who adventure to America, the courage required of those who are willing to engage in battle to establish a colony, the passive nature of those who are content to stay in England, or the material benefits promised by the America continent.

The poems offer an analogue as well to the imperial ambitions articulated in the crown speech. Peckham's A True Reporte is clearly intended to justify the establishment of an English Empire in America, and Peckham rehearses the Biblical and historical precedents for military conquest as well as the documentary evidence that England can rightfully lay claim to portions of North America. No reader could leave Peckham unaware that the proposed colonizing ventures were a prologue to English imperialism. Such plans are implicit in many of the poems, but John Hawkins' contribution makes them explicit when he discusses English expansion in terms of Greek and Roman precedents:

The Romans when the number of their people grewe so great,
 As neigh warres could waste, nor Rome suffice them for
 a seate.
 They led them forth by swarming troupes, to forraine land
 amaine
 And founded divers Colonies, unto the Romaine raigne.
 Th'athenians us'de the like devise, the Argives thus have
 doone,
 And fierce Achilles Myrmidons when Troy was over runne.
 But Rome nor Athens nor the rest, were never pestered so,
 As England where no roome remaines, her dwellers to
 bestow.

(Peckham, pp. 438-39)

Hawkins justifies the plans for overseas expansion on the grounds that England is overpopulated, but he is careful to couch his arguments in allusions to earlier Empires whose success far exceeded the results that might be expected from a pragmatic effort to relieve the pressures of population.

Although the ruggedness of the rhythm argues against these poems being a direct source or influence on Marlowe's meter, the collection contributes to an understanding of Tamburlaine's diction because it demonstrates the readiness of amateur poets to ellide spiritual and

heroic values with the search for material wealth. The similarities between the rhetorical strategies adopted by these poets and by Marlowe makes Tamburlaine's speech seem less a bizarre or ironic statement than a rather polished refinement of a prosody and rhetoric available in popular literature.

Moreover, the effort to enlist young men in overseas adventures by appealing to their sense of honor, patriotism, aspirations, and greed was not unique to these poems. These themes had been sounded earlier in the mathematics textbooks, and it is in these and related works that their fullest exposition can be found. As we have noticed, many of those who wrote mathematical texts and manuals during the Elizabethan period appealed directly to the reader's desire for wealth and heroic status while at the same time assuring them that the pursuit of these desires was divinely sanctioned. Dee's "Mathematical Preface" (1570) is perhaps the best example of this tendency, not only because it was often imitated, but also because Dee's style is occasionally reminiscent of Marlowe's. Early in the "Preface," for instance, when Dee characterizes the benefits obtained from a knowledge of mathematics, his style and vocabulary bear a striking resemblance to Marlowe's in the crown speech: "consider: the infinite desire of knowledge, and incredible power of mans Search and Capacity: how, they, joyntly have waded farder (by mixtyng of speculation and practice) and have found out, and atteyned to the very chief perfection (almost) of numbers practical use" (Dee, sig. *liv). Dee's reference to the "infinite desire of knowledge" and "incredible power of mans Search and Capacity" which has led man to "the very chief perfection" utilizes a vocabulary very

like Tamburlaine's. In addition, the passage is periodic, with "numbers practical use" bearing the weight of what has come before; that is, "the infinite desire of knowledge" is best directed towards "numbers practical use." The structure of the sentence, relying as it does on a terminal phrase to clinch the meaning, resembles the redolent periodicity of the crown speech. Both Dee's sentence and Tamburlaine's speech cap an appeal to the infinite desire for knowledge with an assertion of its practical or material value.

Dee's ability to conflate a hyperbolic description of intellectual potential and speculative capacity with a pragmatic purpose is demonstrated elsewhere when he speaks of the usefulness of mathematics: "That of all Sciences, next to Theologie, it [arithmetic] is most divine, most pure, most ample and generall, most profounde, most subtile, most commodious and most necessary" (Dee, sig. a. i). Dee here employs an iterative technique to gain the emphasis of a periodic phrase. The qualities he catalogues move from the spiritual and intellectual--"most divine, most pure, most ample and generall, most profounde"--to the very practical--"most commodious and most necessary"--with the latter occupying the important terminal position in the sentence.

This combination of the intellectual and the spiritual with the pragmatic or material is a hallmark of Dee's style. This is not to say that Dee always insists on the profit to be derived from mathematics. He also discusses the purely spiritual benefits, but he is more often interested in conflating the religious with the material, or of blurring the distinctions between the spiritual and pragmatic. After a careful discussion of Archimedes' experimental method, and a lengthy

explanation of how to conduct simple experiments in proportion, Dee observes:

Thus can the mathematical minde, deal Speculatively in his owne Arte: and by goode meanes, mount above the cloudes and sterres: and thirdly, he can, by ordre, Descend, to frame naturall thinges, to wonderfull uses: and when he list, retire home into his own centre: and there, prepare more meanes, to Ascend or Descend by: and, all, to the glory of God and our honest delectation in earth.

(Dee, sig. c. iii)

Coming after a long discussion of the usefulness of the experimental method in determining proportion, and the practical benefits which derive from such knowledge, the passage summarizes the commodity of mathematics. But the emphasis on aspiration and descent, on the intellect rising to theoretical speculation and spiritual knowledge, and returning to an interest in the useful applications of mathematics sanctifies the practical aspects of its study.

Dee's "Preface" provides an illuminating analogue to Marlowe's style. Frequently relying on a redolent periodic structure, Dee emphasizes material gain in a vocabulary suggestive of spiritual and intellectual aspiration. And although Dee was not the first mathematician to urge the spiritual value of mathematical study, a comparison between his and earlier styles reveals how far Dee has gone in adopting religious contexts to his interest in pragmatic achievement. In the reader's preface to the Castle of Knowledge (1556), for instance, Recorde speaks most eloquently of the religious reasons for studying cosmology:

Oh woorthy temple of Goddes magnificence: Oh throne of glorie and seate of the lorde, thy substaunce most pure what tonge can describe? thy beauty with starres so

garnished and glyttering: thy motions so mervailous,
 thine influence strange, thy tokens so terrible, to
 stonishe mennes hartes, thy signes are so wonderous,
 surmountinge mannes witte, the effectes of thy motions
 so diuers in kinde: so harde for to searche, and worse
 for to fynde. Thy greatnes so huge, thy compasse so
 large, thy rolling so swifte, and yet seemeth slowe:
 thy staye so vnknownen, thy place without name: thy
 spheres are more wonderes and so is thy fame. . . .
 Oh merauilous maker, oh God of good gouernaunce: thy
 woorkes are all wonderous, thy cunning vnknownen; yet
 seedes of all knowledge in that booke are sown.

(Recorde, sig. a. iiii^v)

Recorde's rime and alliteration has its antecedent in religious prose.¹⁴

Thus in both style and content, his preface is modelled primarily upon religious prototypes. The differences between Recorde's catalogue of the applications of mathematics and Dee's demonstrate their differences in emphasis as well. Recorde alludes briefly to a few applications, and they are traditional; he does not go much further than mentioning the usefulness of mathematical calculations to doctors, lawyers, merchants, and farmers. Dee's preface includes these uses, too, but he expands the application of mathematics to every field of secular life, emphasizing the material benefits which come from such application. Recorde carefully separates the pragmatic from the spiritual, and insists that the spiritual is more important. Dee combines the spiritual with the secular and demonstrates that they are complementary.¹⁵

Dee's preface and the Peckham poems indicate that by the late 1580s, there had developed in England a rhetoric suitable for promoting ambition, aspiration, and self-aggrandisement in a way that suggested these impulses, when channeled in certain directions, were divinely sanctioned. And as Dee's "Preface" and the prefaces appended to similar works demonstrate, this rhetoric was first developed or found its fullest

exposition in works designed to promote scientific study and traced its parentage to the religious cast of earlier mathematical texts.

A somewhat later example of this prose style is found in Thomas Hood's A Copie of the Speache made of the Mathematical Lecturer.¹⁶ The running title indicates the speech was made at the home of Thomas Smith, the wealthy merchant and investor, on 4 November, 1588. The occasion was the founding of the Hood Lectures. Although the Armada had been defeated, Hood was commissioned to lecture to the city captains recruited in preparation for what the English believed was an impending Spanish invasion. Hood's immediate purpose was to lecture on mathematics as "a knowledge most convenient for military men" (Hood, sig. A. iii). But since the lectures continued for almost a decade, it is obvious that shrewd Merchant Adventurers like Smith realized the advantage of developing a pool of technicians trained in navigational mathematics.¹⁷

Hood's lecture, which was printed shortly after its delivery, provides a history of mathematics, catalogues briefly its applications, and discusses the practical aspects of mathematics in religious overtones:

Look up if you please to the heaven above, or turne your eye downe to earth beneath, or round about to the wandering Sea, thinke on your warres, and traffique abroad, or other your private affaires at home, your business at home, your wares abroad, your traffique beyond sea, the earth beneath you, the Sea about you, the heaven above you is fully fraught with the praise thereof.

(Hood, sig. B. ii)

The distance between Recorde and Hood is obvious here. Recorde sought to inspire his readers to look up to the "woorthy temple of Goddes

magnificence"; Hood urges his reader to look with one eye "to the heaven above," and to keep one eye on his "traffique abroad" and "business at home." Hood's most immediate predecessor in this metaphor is Dee, who promised his readers they could use the study of mathematics "to Ascend or Descend by: and, all, to the glory of God and our honest delectation in earth." Hood appropriates the secular tendency in Dee by conflating religious language with a description of the particular interests of his audience. The merchants he addressed must have been delighted to hear the importance of their daily business couched in such terms.

Hood exercises his ability to gauge an audience again at the end of the speech when he addresses himself to the immediate occasion. He urges London's military captains to study mathematics in order to gain military honor and gold:

loving Schollers, (for now I am holde to use that name)
 If the commodities of our profession be so great as
 nothing more, if the pleasure be without comparison, if
 these be the footsteppes of men wherein you must treade,
 whose very sight may countervaille your sorow, if you
 have a care for your honorable name, if you think it a
 fowle disgrace for want of knowledge to be circumvented,
 as Haniball was by Fabius Maximus or as Cyrus the King
 by Tamiris the Queene: If it be the hazard of your
 life and name in skaling a forte to bringe a ladder too
 shorte by the halfe, as King Phillip did, whereby he
 cast away all his men: if you loathe to have your
 inferior Souldiers triumph over you for wante of arte,
 as Palamades did over Agammenone the king, being better
 seen in marshalling his men; in short, If you think it
 a blessed thing to compasse the world, and return again
 enriched with golde, now have an especiall care unto the
 same.

(Hood, [B. iiii])

Thus Thomas Hood, the mathematician who delivered the first public lectures on mathematics in England, appeals to his listeners to study mathematics. Hood has been careful, of course, to argue the respectable

history of mathematics, and to remind his listeners that God made man upright so that he might better contemplate the heavens and come to understand God. Hood has stressed as well the social necessity for studying mathematics in his references to clerics, lawyers, and doctors, and has referred to the military advantages gained from such study. But when he directly addresses his listeners--the defenders of the realm--his appeal is to the ambition "to compasse the world and return again enriched with golde."

Hood's speech was delivered not long after the time that 1 Tamburlaine is supposed to have been first produced. The speech provides a useful barometer for the London social climate in the winter of 1588, and indicates as well how close were the connections between mathematics, military training, and the dreams of overseas empire. The hyperbolic rhetoric used by Dee, with its characteristic conflating of spiritual, intellectual, and material impulses, becomes in the hands of Hood an instrument for urging mathematical studies on those who would defend their country and enlarge the national treasury, to say nothing of their own purses. Understood in this context, Tamburlaine's crown speech seems to be a concise statement of attitudes well articulated by a portion of London society.

Perhaps the most startling refinement Marlowe makes of these attitudes comes in the first of the speech, when Tamburlaine asserts that he is driven to empire-building by a kind of divine imperative. Although Dee, the contributors to the Peckham collection, and Hood argued that God sanctions the practical applications of mathematics, including their employment in furthering overseas expansion, the deity

they invoke is obviously not the same as that invoked by Tamburlaine:

The thirst of reign and sweetness of a crown,
That caused the eldest son of heavenly Ops
To thrust his doting father from his chair,
And place himself in the imperial heaven,
Moved me to manage arms against thy state.
What better precedent than mighty Jove?

(1 Tamb., II, vii, 1-17)

Tamburlaine's god is necessarily not the Christian deity, but the fact that the speech includes a reference to divine sanction bears on the similarity between the content of the entire speech and the sentiments expressed by those who elided spiritual aspirations with the pursuit of military honor and imperialist expansion.

In his A True Reporte, Peckham presents just such a discussion of providence. He is at pains to justify planting colonies and establishing English sovereignty at the expense of the Indians already inhabiting America, and he premises his arguments on the assumption that it is no sin to spread Christianity to all corners of the world:

And in so dooing, doubtles the Christians shall no whitt
at all transgresse the bondes of equitie or civillity,
for as much as in former ages, (yea before the incarnation
of Christ) the like hath been doon by sundry Kings
and Princes, Governors of the children of Israell:
cheefely in respect to beginne theyr Planting, for the
establishment of Gods word: as also since the nativity
of Christ, myghty and puissaunt Emperours and Kinges
have performed the like, I say to plant, possesse, and
subdue. For prooffe whereof, I wyll alledge you examples
of both tymes.

(Peckham, p. 453)

Peckham's rehearsal of military conquest made in the name of God includes references to Joshua, Theodosius, and Constantine, the latter of whom owed his success to his willingness to build an empire "part by freendly perswasions, part by maine strength" (Peckham, p. 457).

Peckham concludes his discussion by rebutting those who feel such military incursion is immoral:

Heerin have I used more copy of examples, then otherwise I would have doone, saving that I have been in place where this maner of planting the christian Faith, hath beene thought of some to be scarce lawfull, yea, such as doo take uppon them to be more than meanly learned. To these examples would I joyne many more but whosoever is not satisfied with these fewe, may satisfie himselfe in reading at large the aucthors last above recited. Thus have I (as I trust) proved that we may justly trade and traffique with the Savages, and lawfullie plant and inhabite theyr Countries.

(Peckham, pp. 457-58)

Although his closing remarks make the plans for colonization sound like little more than an intention to open trade negotiations with the American Indians, Peckham's discussion has made it quite clear that the plans are to take land away from them, by force if necessary, and his allusions to wars of missionary zeal reinforce the point.

The divine qualities emphasized by Peckham take on the complexion of the martial god invoked by Tamburlaine. Both assume that divinely inspired actions serve as precedents justifying military expansion, and the portrait of Constantine provided by Peckham resembles in many ways that of Tamburlaine. While there are no consistent parallels between the qualities of Jove and the God Peckham depicts, it is clear that the desire to plant in America brought with it the necessity of portraying divinity as a god of power. As Peckham indicates, the plans for aggressive colonization brought objections from some quarters, and "hath beene thought of some to be scarce lawfull." Thus the deity of Peckham's argument was one invoked primarily by those interested in justifying military conquest, and Peckham's brief for the exercise of

power in the name of God bears a significant similarity to the argument offered by Tamburlaine.

The similarities between the martial deities invoked by Peckham and Tamburlaine would not seem so pertinent if the rest of the speech did not obviously echo other components of the expansionist spirit; for example, the supposition of Pelham and Bingham that man is naturally restless and seeks new challenges for his intellectual and spiritual energies is echoed in Tamburlaine's appeal to the patterns of nature: "Nature, that framed us of four elements/Warring within our breasts for regiment,/Doth teach us all to have aspiring minds" (1 Tamb., II, vii, 18-20). Unlike the Renaissance commentators on human psychology, who would argue that the healthy individual achieves a balance of humours¹⁸--of the four elements "warring within our breasts"--Tamburlaine asserts that this elemental conflict gives him direction. The very unorthodoxy of the statement expresses concisely ideas implicit in Pelham and Bingham, since they both assume the impulse towards unrestrained freedom and aspiration is universal. The reference to humours fleshes out these assumptions by articulating the premise that the expansionist spirit is natural to human nature, and if properly exercised, will help win an empire.

Perhaps little more need be said about the closing lines of the crown speech. Although the diction has seemed inconsistent to many critics, the desire to channel the energies of the aspiring mind towards secular interests generated a rhetoric very similar to that found in the speech. The "earthly crown" gives economical expression to the goals stated in the poems appended to Peckham, in Dee's preface, and in

Hood's speech. Common to these works is the expansionist spirit. Peckham's True Reporte and the appended poems promote aggressive imperialism, Hood unashamedly urges his listeners to "compasse the world and return again enriched with golde," and Dee energetically justifies self-aggrandizement and the search for profit. It is worth remembering, moreover, that Dee was apparently the first to use the term British Empire in print.¹⁹ All these men speak a language laden with spiritual overtones, and all do so in an effort to promote the aggressive pursuit of secular rewards.

Tamburlaine's crown speech, with its justification of conquest by reference to a martial deity, its assertion that the need to aspire is natural, its reference to contemplating and measuring the spheres, and its elliding of spiritual and material values, outlines the Elizabethan expansionist spirit. The rest of the play limns in the details. The male characters are motivated by the desire for empire. The only exception is Tamburlaine's son Calyphas, who is presented as the kind of "sluggard" Bingham disparages. Even Mycetes in his fumbling way seeks to maintain his hegemony, and the greatest sin laid to him by his brother Cosroe is that he lacks the strength to do so. Tamburlaine's attention to cartography and ballistics is one facet of this theme, and his confidence that he can dominate the world by means of a superior navy rather obviously echoes the assumptions of England's empire-builders.

While Tamburlaine portrays the expansionist spirit, it would be wrong to assume that the play qualifies as a full exposition of the Elizabethan Age. But the portrait of the aspiring hero reflects the ambitions of certain governmental, aristocratic, scientific and business

interests. The alliance forged between these interests by their common pursuit of English expansion was not universally applauded. Mathematicians were still regarded with suspicion by much of the population --Dee's library was burned in 1583--and as Peckham's comments indicate, the plans for aggressive colonization were regarded as "unlawful" in some educated circles. But if the efforts made on behalf of overseas expansion were not universally applauded, the attitudes they represent were not as confined as is often supposed. The assumption that the aspiring spirit embodied in Tamburlaine reflects Marlowe's activities in a sort of intellectually rebellious Elizabethan underground, or that it includes ideas which can be connected exclusively with Raleigh's interests²⁰ underestimates both the cooperative effort necessary to mount a campaign of overseas expansion in the face of Spanish naval dominance, and the extent to which those interested in such expansion actively promoted their designs and sought to interest the young and ambitious in them.

There were certainly sufficient contemporary figures to serve as models for Marlowe's portrait. In both their daring and their ruthlessness, Drake, Cavendish, Raleigh, and Humphrey Gilbert, and others who engaged in similar pursuits resemble Tamburlaine; yet Marlowe chose to distance his subject in both space and time. While it is impossible to second-guess his reasons, it is possible to discern the effects. By placing the aspiring hero in a distant and strange setting, Marlowe invested Tamburlaine with the kind of heroic glitter that clung to the romances then popular in England. So entranced was the younger generation of courtiers with the "medieval" exotica of the romances that they

revived at court ceremonies of an older chivalry which, to use Anthony Eslin's words, "brought back some of the gaudier aspects of the Gothic world for a final flowering in the tiltyards of Elizabethan England."²¹ Even when confronted with the realities of war, courtiers like Essex indulged in the Gothic fantasy, dressing themselves and their ceremonial squires in gorgeous if useless chivalric finery.²² As is the case with Tamburlaine, the romance heroes could be inflated to Herculean proportions precisely because they were not purported to be their reader's contemporaries. Marlowe's Tamburlaine, while it does not espouse the chivalric ideal, certainly participates in an Orlandoesque inflation, and the historical setting contributes to this.

The setting contributes as well to a distancing of the subject matter because it allows for a detached view of the familiar. Shakespeare places one of his studies of ruthless self-aggrandizement in an English context, and Chapman does so as well. Bolingbroke in Richard II is depicted as having played a key role in the emergence of the English monarchy, and Chapman insists upon the correspondence between his Byron and Essex. The connotations of Shakespeare's place names--Westminster Hall, Pomfret Castle--are immediate and English. Chapman's Byron makes frequent comparisons between the French and English courts, and visits Elizabeth. Even when they turned away from an English setting, Shakespeare and Chapman provided an immediate context for their histories by setting them in ancient Rome, to which England naturally traced her ancestry.

But this emphasis on the familiar is absent from Tamburlaine. While the wealth of the Levant appealed to the English imagination,

Eastern culture was regarded as particularly strange and lawless,²³ and the Moslem religion was often contemplated with scornful contempt.²⁴ Despite the threatened encroachments of the Turks into Continental Europe, their influence on English history was not felt to have been as profound as that of Greece and Rome, although it is true that the Protestant revisionists often identified the Turkish invasion as a manifestation of the anti-Christ. This sense of the unfamiliar is reinforced in Tamburlaine by the foreignness of the place names--Persia, Arabia, Africa, Media, Armenia--some of which were not completely outlined on contemporary maps.

The historical view of Tamburlaine contributes to the distancing as well. Although contemporary historians often dealt with Tamburlaine as a Scourge of God, this designation was interpreted in contradictory ways. LeRoy, for instance, is far more interested in Tamburlaine as epitomizing the temper of the modern era.²⁵ Fortescue simply reports Tamburlaine's angry answer to a curious merchant that he was "the wrath and cruelty of God."²⁶ Bodin's The Six Bookes of a Commonweale examines the implications of the Scourge more fully. Bodin discusses the morality of rebellion against an evil magistrate, and used Tamburlaine's attack on Bajazeth to demonstrate when a "stranger" to the realm may rightfully intercede in order to protect subjects from tyranny.²⁷ There is, however, a similar discussion in another work which comes to the opposite conclusion. William Bavande's A woorke of Ionnes Ferrarius Montanus, touchynge the good orderynge of a common weale (1559), which apparently has not been examined in connection with Tamburlaine, includes a discussion of why people should not rebel against a bad magistrate.

The assumption seems to be that God turns evil to good uses, and it should therefore be patiently borne:

Thus is it that God threateneth to sende children to rule over us, and be our kynges, euen in his furie: Whereby it evidently appeareth, that wicked magistrates be sent into the worlde, as that Ate whiche Homere speaketh of, for mannes vicious livyng, that one evil may be expelled with another and that evil maie be persued by soche, as be no less euill than thei themselues. . . . Tamerlanes also the great prince of Tartaria, which when he had taken Baiazete the Turke prisoner, and caried him about in a cage, as a spectacle of mannes mutable estate, when one asked him, why he used such crueltie againste any man, he aunswered thou iudget madlie to thinke me to bee a man, I am the anger of GOD, and the destruction of the whole worlde.
(Bavande, pp. 178-178^v)

While Bavande's discussion of Tamburlaine is too short to be considered as a source, it demonstrates how various could be the interpretations of Tamburlaine's historical importance. Bodin uses the figure to justify rebellion under certain circumstances, Bavande to argue for patient submission regardless of the tyrant's cruelty, while LeRoy and Fortescue are interested in other aspects of Tamburlaine's career.

The exotic setting, the unfamiliar geographic names, and the variable interpretations of Tamburlaine detach the play from a familiar context. The effect of this is to divest Tamburlaine's behavior of any immediate implications. The presentation of Tamburlaine therefore allows for a careful analysis of the aspiring hero. Marlowe does not insist that his audience think of Drake, or Raleigh, or any other Englishman when he presents them his Tamburlaine, nor does he require them to associate Tamburlaine's military conquest with an invasion of cities and countries familiar to Elizabethans. While his study of the expansionist spirit is larger than life, it is remote and strange.

This is typical of Marlowe's early dramatic style. Not until Edward II and Dr. Faustus does he present sympathetically drawn characters. Whether this is a sign of his immaturity, or whether it is part of his intent cannot be conclusively decided, but in Tamburlaine he has written a play which displaces the familiar to the unfamiliar, and the result is a play evoking astonishment, even confusion, but not sympathy, fear, or catharsis. The audience is asked to examine Tamburlaine, but not to identify with him, and the examination is complicated by the introduction of contradictory moods--the oscillation between expansiveness and constraint. The flavor of the play suggests that it is much less a presentation of Marlowe's private predilections than an invitation to examine the emerging expansionist spirit.

II

The expansionist spirit embodied in Tamburlaine is examined through images evocative of both willful aspiration and determinism. Tamburlaine describes himself at times as self-motivated, and at others as an instrument of God; as driven to exceed the boundaries of the human potential and as subservient to his natal stars. Thus Tamburlaine's language weaves the pattern of the limitless and the limiting, and just as the diction of the crown speech provides a clue to the social contexts alluded to in Marlowe's portrait of Tamburlaine, so Tamburlaine's self-descriptions indicate the intellectual or philosophical background.

Perhaps the most striking imagery in the play is invoked to characterize Tamburlaine's aspiration. Considering Tamburlaine's imperial ambitions, it is hardly surprising to find him articulating his aspiration in terms of military conquest. But what is unusual about Tamburlaine's geographical references is his desire not simply to conquer the known world, but to reach always for the unknown, for locales not fully mapped, for regions seldom seen. The historical Tamburlaine planned to sweep across Europe to Spain and back east through North Africa.²⁸ Marlowe's Tamburlaine will not so confine his ambition:

So from the East unto the furthest West
 Shall Tamburlaine extend his puissant arm.
 The galleys and those pilling brigandines,
 That yearly sail to the Venetian gulf
 And hover in the Straits for Christians' wrack,
 Shall lie at anchor in the Isle Asant,
 Until the Persian fleet and men-of-war,
 Sailing along the oriental sea,
 Have fetched about the Indian continent,
 Even from Persepolis to Mexico,
 And thence unto the Straits of Jubalter,
 Where they shall meet and join their force in one,
 Keeping in awe the Bay of Portingale
 And all the ocean by the British shore;
 And by this means I'll win the world at last.
 (1 Tamb., III, iii, 246-60)

In addition to images of physical extension, Tamburlaine's aspiration is expressed in terms of ascensionism. He describes himself as "affecting thoughts co-equal with the clouds" (1 Tamb., I, ii, 64), and promises Theridamas a constant partnership "until our bodies turn to elements,/ And both our souls aspire celestial thrones" (1 Tamb., I, ii, 235-36). The ambition to extend himself beyond earthly confines is at its strongest when he boasts of his martial prowess:

Our quivering lances shaking in the air
 And bullets like Jove's dreadful thunderbolts,
 Enrolled in flames and fiery smoldering mists,
 Shall threat the gods more than Cyclopien wars;
 And with our sun-bright armour, as we march
 We'll chase the stars from heaven and dim their eyes
 That stand and muse at our admiréd arms.
 (1 Tamb., II, iii, 18-24).

There are numerous examples of Tamburlaine's description of his aspiration in terms of physical extension and ascensionism. As the crown speech indicates, these aspirations are often linked with divine precedent. Tamburlaine tells Zenocrate at their first meeting that he "means to be a terror to the world,/Measuring the limits of his empery/By east and west, as Phoebus doth his course" (1 Tamb., I, ii, 39-40). And he reminds Theridamas: "Jove sometimes masked in a shepherd's weeds./And by those steps that he hath scaled the heavens,/May we become immortal like the gods" (1 Tamb., I, ii, 198-99). Tamburlaine thus conceives of his aspiration as an imitation of the divine, and uses the assumption to justify his desire to extend himself to infinite or indeterminate bounds.

Tamburlaine's insistence upon this holy conjunction is undoubtedly the most often remarked feature of the play. Godshalk succinctly articulates the problem it poses when he asks, "Should we accept Tamburlaine's glorious estimation of himself as divinely inspired and heavenly bound, or the estimation of his enemies, who, like Bajazeth, see him as diabolic?" (Godshalk, p. 114). Godshalk bases his answer on the traditional assumptions of literary historians about Elizabethan attitudes regarding ambition: "All in all, the Renaissance saw discontent with human limitations as the prime factor in social disruption.

And these moral generalizations of the critics may easily be documented from the lives and loves of the Tudor nobles and courtiers. Marlowe, as well as the critics, was confronted by this recklessly ambitious society" (Godshalk, p. 35). As he indicates, Godshalk's invocation of the Elizabethan abhorrence of ambition is characteristic of many Marlovian critics; however, few explain their underlying assumptions as fully as Masinton:

Englishmen were taught that God created an ordered universe and that man occupied a designated, fixed place in it. It is man's responsibility to preserve this order--as well as his fallen condition allows him to--by keeping his station in life and upholding the existing social and political system, which constitutes a vital part of the universal structure. Man should, in short, attempt nothing that might disrupt the harmonious pattern of rank and degree in the Great Chain of Being. Since each link in the Chain is interrelated with and dependent on the others, Tamburlaine's rebellion threatens not only the organization of human society but also the entire cosmological arrangement. The possibility of such general disorder was, therefore, frightening and abhorrent to an Englishman of Marlowe's time.

(Masinton, p. 26)

Although other critics often present their historical premises less explicitly, Masinton's epitome clearly underlies most discussions of Tamburlaine's divinely inspired aspiration. Since the natural and social order symbolized by the Aristotelian-Ptolemaic cosmography is considered normative for the Elizabethan age, Tamburlaine's assertiveness is particularly problematic. His assumption that he possesses unlimited potential disregards physics as well as morality because Aristotelian physics excluded the concept of unlimited extension. Space was conceived as a container requiring a thing contained, and could therefore extend no further than the concave surface of the outermost sphere of the

world. Beyond that, there was nothing contained, and therefore, no container. This conception of space underlies the closed Ptolemaic world, and is the basis for assuming a finite, hierarchal order in which all things have their proper "space" and seek to return to it if disrupted. The Aristotelian physics renders absurd Tamburlaine's assertion that he follows both divine and natural impulses when he seeks to extend himself--either physically across the globe or "upwards" into the heavens. Given this context, it is easy to understand why critics are prone to assume that Tamburlaine's language reflects either Marlowe's ironic intentions or his confused rebellion against Elizabethan intellectual constraints.

But the Aristotelian physics had never gone completely unchallenged, and during the Renaissance it came under increasing attack. The conception of space as container required that the extra-mundane be defined as a state of privation. This definition of the extra-mundane was particularly vexing to Christian commentators on Aristotle. At issue was the question of divine will. If the extra-mundane is a state of privation, then God can act only in the finite space of the world, since something cannot be created where there is no potential container for it. Thus Aristotelian space places a constraint on divinity, and resolving this difficulty led to a definition of the extra-mundane as an infinity co-extensive with God. Such arguments were first offered in the fourteenth century, and from then until Bruno's important works in the sixteenth century, infinity as a metaphysical concept became increasingly important to conceptualizing the physical world.

While earlier commentators defined infinity as a concept available only to the intellect through an act of faith, their fifteenth and sixteenth century counterparts sought to elucidate the divine by adjusting their notions of the physical world to the implications of infinity. Drawing upon Platonist conceptions of infinity and number the discussions merge the metaphysical with the physical, and nature is seen to participate in infinity. Consequently, divine immanence informs creation, and each individual participates in a finite way with divine infinite extension. Moreover, since the concept of infinity derives from the supposition that God's will is unconstrained, human willfulness or aspiration is assumed by some commentators to be an apt analogue to divinity. For these reasons, the historical debate over Aristotelian physics provides a useful context in which to place Tamburlaine's assertion that his willful desire for physical extension is divinely inspired.

The impetus for identifying God with an extra-mundane infinity seems to have come from the Condemnation of 219 Articles by the Bishop of Paris in 1277. Using the physical conceptions of their mentor, the Christian Aristotelians had developed a deterministic theology that placed serious constraints on divine will. They argued that God could not create another world since there was no potential "space" for one, and that God could not move the world to another place because it would leave a void and there can be no void in nature. The 219 Articles condemned these and similar tenets, and one recent historian assumes that these Condemnations led the fourteenth century commentators Bradwardine and Oresme to offer the argument that there was beyond the

world an "imaginary" infinity co-extensive with God.²⁹ In his De Causa Dei Contra Pelagium (c. 1344), Bradwardine argues that God cannot be confined to the place where he created the world, as the Aristotelians suggest, because "it is more perfect to be everywhere in some place, and simultaneously in many places, then in a unique place only."³⁰ Bradwardine concludes that outside the finite space of the world "there is in fact an imaginary void . . . which I say is void of any body and of everything other than God."³¹ God is thus co-equal with a region conceived as neither space nor privation, but as "infinitely extended without extension and dimension."³²

Bradwardine conceives of the world as a kind of finite dimple enfolded in this "imaginary extension." Because of his infinite magnitude, God can act as he chooses. He can--if he so wills--displace or re-create this world and create others as well. But the infinite nature of God is not physically demonstrable. Infinity is evident only to the intellect, and its realization remains an act of faith. Oresme emphasizes this point as well in his Questions on De Caelo (c. 1350):

according to faith there is no space outside the heaven but one can concede that outside the heaven there may be a vacuum because God can create a body or a place there. Therefore, if it is asked what is that vacuum outside the heaven, one should reply that it is nothing but God himself, Who is His own indivisible immensity and His own eternity as a whole and all at once.³³

Oresme, like Bradwardine, is anxious to avoid constraints on God, and he therefore identifies with God with the extra-mundane; but since it is neither space nor privation, the extra-mundane can be comprehended only through an act of faith.

Although Bradwardine and Oresme insist upon its "imaginary" nature, the physical implications of infinity inevitably became a subject of inquiry. This interest underlies Nicholas of Cusa's discussion of God in geometrical terms probably suggested to him by his study of received Platonist texts.³⁴ In Of Learned Ignorance (1440), Cusa identifies God with the infinite sphere, which he terms the Maximum. The Maximum is an actualizing agent "because it envelopes all things" (Cusa, p. 77). Since all of creation has form, it is necessarily finite; however, to the extent that creation derives from God, it shares in His infinity. Universal space is therefore limited, but of indeterminate bounds. His spatial conceptions lead Cusa to dismiss as illogical the idea that the world has a center. Within infinity there can be neither an absolute center nor an absolute circumference. Similarly, there is no reason to maintain a distinction between the "baseness" of the earth and the "superiority" of the planets, since all measurement is relative when premised on infinity (Cusa, pp. 113-14). Moreover, if God is "the centre and circumference of all stellar regions" as well as of the world, there is reason to suppose that He has created life there, too (Cusa, p. 115).

Although he is not entirely consistent, Cusa's conception of the physical world as a reflection of divine infinity results in the assumption of divine immanence. Creation participates in infinity in a limited or finite manner. Man, conceived as microcosm, participates most completely since he embraces "within himself all things." Human nature is therefore "a nature that, raised to union with the Maximum, would exhibit itself as the fullest perfection of the universe and of

every individual in it, so that in this humanity itself all things would achieve their highest grade" (Cusa, p. 135). Despite this argument in favor of the human potential, Cusa declares that the "limited existence of the individual" prevents such union, Christ being the singular exception (Cusa, p. 138).

Cusa's Learned Ignorance is a thorough effort to conform the physical world with the concept of infinity. Universal space is indeterminate, extra-terrestrial life is a distinct possibility, earth is not essentially inferior to other works of God's creation, and human nature has the potential--though admittedly unrealizable--to unite with the infinite divine. While the concept of infinity is essentially metaphysical, Cusa's interest in conceiving of it in physical terms is indicated by the geometrical metaphor governing his discussion.

Although Cusa evidently attracted little immediate attention, his work gained in popularity during the Renaissance.³⁵ His influence can be seen, for instance, in Marcellus Stellatus Palingenius's Zodiacus Vitae (complete translation by Barnaby Googe, 1576), a work which synthesizes Platonist conceptions of infinity with the Aristotelian-Ptolemaic world-picture. Palingenius insists upon the existence of other inhabited regions as a corollary of infinite divine will. It is unthinkable to Palingenius that God should fail to exercise His creative impulse:

This God what so euer he could doe assuredly did frame,
Least that his vertue were in vaine, and neuer should ly
hid,
But since he could make endlesse things, it must be
thought he did,

And all his power therein emploied so that there did
 remaine,
 In him no kinde of power or force that idle were or vaine.
 (Googe, pp. 229-30)

Palingenius, like Cusa, assumes that these extra-terrestrial inhabitants enjoy "a better state and life . . . and farre more blessed bee" than man (Googe, pp. 115-16). And like his predecessor, he maintains the distinction between universal space and the absolute infinity of God:

But learned Aristotle sayth there can no body bee,
 But that it must of boundes consist: to this do I agree,
 Because aboue the Skies no kinde of body we do place,
 But light most pure, of body voyde, such light as
 comprehend
 Our eyes cannot, and endlesse light that God doth from
 him send,
 Wherein together with their king the Sprites that are
 more hie
 Doe dwell, the meaner sorte beneath in skies doe alwaies
 lie.
 Therefore the reigne and portion, of the world consistes
 in three,
 Celestiall, Subcelesticall which with limits compast bee:
 The Rest no boundes may comprehend which bright aboue
 the Skie
 Doth shine with light, most wonderfull.
 (Googe, pp. 229-30)

Palingenius assumes as did the fourteenth century commentators that the world or subcelestial region is a finite dimple enfolded by the infinity of God. Unlike Cusa, he does not assign indeterminate bounds to universal space, nor does he relinquish the conception of the world as hierarchic. But he goes further than Cusa in assessing the relationship between divine infinity and human nature:

But nothing passeth God in powre, nor stronger is than he;
 Therefore he nether can nor will with limits compast be.
 For who would haue his force restrained, when that he may
 be free
 And walke abroad where as he list, with power at libertie?
 No Man there is that doth desire himselfe for to abase,

And alwaies seeke for to enhounce the state that here
 they leade,
 And, though their wings be large and wide yet farther
 them to spreade.
 Will God then, while he may be greatest of powre
 omnipotent,
 His proper force himselfe restraine and lue in limites
 pent?

(Googe, p. 228)

The implication of human nature in infinity is stated more positively here than in Cusa. Since God is understood as infinite and unrestrained will, the human impulse to aspiration is the most fitting analogue to Him.

Palingenius' interest in extra-terrestrial inhabitants as well as his assumptions about human aspiration reveal the degree to which the metaphysical concept of infinity has shaped his appreciation of the physical world. Both Cusa and Palingenius discuss infinity in physical rather than metaphysical terms. Cusa employs a geometrical vocabulary to define God, and Palingenius defines Him as infinitely extended light. The tendency in Cusa and Palingenius is not to conceptualize infinity as an idea comprehensible only to the intellect or by means of faith. Their arguments indicate that infinity impinges on physical and human nature, and their language suggests that infinity can be realized in physical terms. To provide a complete definition of infinity as a physical concept, Cusa and Palingenius would have had to extend corporeality into the extra-mundane. This they did not do. But their insistence on discussing the physical implications of infinity contributed to the intellectual climate which made such a definition possible.

Palingenius' Zodiacus Vitae was popular in Protestant countries.

One of its readers was Thomas Digges, who refers to and quotes Palingenius in his "Perfit Description."³⁶ As we have seen, Digges was the first to embed the Copernican heliocentric world in an infinite space. Digges could not ignore the problem presented by his placing corporeal bodies into the extra-mundane reserved to God, and he resolves the difficulty somewhat ambiguously by shuffling together the theological and physical concepts of the extra-mundane.³⁷ The fixed stars are for Digges extended into both a physical and a metaphysical infinity. The stars extend "up in Sphaericall altitude without ende":

Of which lightes Celestiall it is to bee thoughte that we onely behoulde sutch as are in the inferioure partes of the same Orbe, and as they are hygher, so seeme they of lesse and lesser quantity, euer tyll our sighte being not able farder to reache or conceyue, the greatest part rest by reason of their wonderfull distance inuisible vnto vs. And this may wel be thought of vs to be the gloriouse court of y^e great god, whose vnsercheable worcks inuisible we may partly by these his visible cōiecture, to whose infinit power and maiesty such an infinit place surmountinge all other both in quantity and quality is conueniente.

(Digges, pp. 888-89)

Digges cannot relinquish the theological conception of God as the perfect sphere and like Cusa he endeavors to reconcile this finite geometrical figure with the concept of infinity. His argument that an "infinite place . . . only is conueniente" for God's "infinite power and maiesty" echoes Bradwardine and Oresme, and further demonstrates Digges's sensitivity to the metaphysical implications of infinity. But Digges has moved beyond their conception of an "imaginary" infinity, and beyond Cusa's and Palingenius' conceptions as well. While Cusa and Palingenius explored the physical implications of infinity, they did not

assume that anything corporeal was co-extensive with infinity. Digges assumes the stars are, and for that reason they "may well be thought of vs to be the gloriouse court of y^e great god." The "Perfit Description" thus culminates the line of reasoning pursued by Cusa and Palingenius: infinity has become a physically demonstrable attribute of God, but retains its metaphysical significance.

Digges's conception of infinity is certainly influenced by the Platonist theories which preceded him. The Neo-Platonic emphasis on the importance of the sun seems to have influenced him as well. While it had long been a significant theological and political symbol, the Italian Neo-Platonic revival did much to foster an attitude towards the sun that Mumford and others have called sun-worship.³⁸ Several scientific historians have argued that Neo-Platonist sun-worship inspired Copernicus to conceptualize the world as heliocentric.³⁹ Whether or not this was the case, Copernicus certainly invests the sun with metaphysical significance:

Then in the middle of all stands the sun. For who, in our most beautiful temple, could set this light in another or better place, than that from which it can at once illuminate the whole? Not to speak of the fact that not unfittingly do some call it the light of the world, others the soul, still others governor.⁴⁰

The correlation between Neo-Platonic mysticism and the symbolism of the sun certainly influenced those who accepted the Copernican system.

Kepler is the most often cited example but Digges reflects this attitude as well: "the Sunne, which like a king in the midst of all raigneth and geeueth lawes of motion to y^e rest, sphaerically dispearsing his glorious beames of light through all this sacred

Coelestiall Temple" (Digges, p. 79). Digges knew, as did Copernicus, that the significance attached to the sun and the notion of a mobile earth were derivative of Pythagoras.⁴¹ Thus Digges profited from the Neo-Platonist revival, both in his acceptance of heliocentricity and in his conception of an infinitely extended corporeality.

A similar influence has long been recognized in the works of Giordano Bruno. While Digges does not discuss the implications of his concept for human nature, Bruno makes them his primary concern. He published two important works on infinity while in England, and his thinking may have been stimulated by a familiarity with Digges's ideas, since both link Copernicanism with infinity. Bruno knew the works of Cusa and Palingenius,⁴² and his argument reflects as well his general awareness of the traditional arguments in favor of an infinite divine will.

The problem of defining divine will and its relationship to physical and human nature is central to Bruno's discussions. In On the Infinite Universe and Worlds (1584), Bruno dismisses the idea that God is co-extensive with the infinite extra-mundane because this implies a constraint on divinity:

it is I say impossible that I can with true meaning assert that there existeth such a surface, boundary or limit, beyond which is neither body, nor empty space, even though God be there. For divinity hath not as aim to fill space, nor therefore doth it by any means appertain to the nature of divinity that it should be the boundary of a body.⁴³

With this argument, Bruno dismisses the concepts offered by the fourteenth century commentators. They had sought to provide a physical explanation which would not place constraints on God. Bruno is eager to

do the same thing, and attacks the theory of an extra-mundane infinity precisely because it assumes God's nature is confining. God does not function as a "container"; rather, he is infinite act, and has created numerous other worlds like our own.

Bruno had logically to assume there is no distinction between mundane and extra-mundane space. While he seems to argue for this homogeneity, he nonetheless retains, as did Cusa, a distinction between God's absolute infinity and the corporeal or limited infinity of universal space:

PHIL: I say that the universe is entirely infinite because it hath neither edge, limit, nor surfaces. But I say that the universe is not all-comprehensive infinity because each of the parts thereof that we can examine is finite and each of the innumerable worlds contained therein is finite. I declare God to be completely infinite because he can be associated with no boundary and his every attribute is one and infinite. And I say that God is all-comprehensive infinity because the whole of him pervadeth the whole world and every part thereof comprehensively in the whole but not comprehensively in those parts which we can distinguish within the whole, if indeed we can use the name parts, since they appertain to an infinite whole.

(Bruno, On the Infinite, pp. 261-62)

As did Cusa, Bruno argues that to the extent it derives from the divine, physical nature participates in infinity; but the participation is necessarily limited by the finite character of physical nature. Nonetheless, Bruno is far more willing than Cusa to explore the implications of divine immanence. In Concerning the Cause (1584), he remarks, for instance, on the appropriateness of the Platonist conception of the universal intellect as the creative power, which "infusing and bringing something of its own matter--restful and moveless in itself--produces everything." The Platonic concept assumed that form

was imposed upon matter and thus endowed it with act. Bruno's idea differs from this. He calls the universal intellect "the inner artificer because it shapes matter and figures it from within."⁴⁴ The difference means that matter or potency does not have "act" superimposed upon it; rather, physical nature is inherently both potency and act. It therefore participates in the divine, because for Bruno the divine nature is simultaneously the potential for act and act itself.

As a consequence of Bruno's theory of immanence, human nature has the potential to fully implicate itself with the infinity that is God. In Concerning the Cause, Theophilus is asked what would happen if the "potency from below"--that is, the potential inherent in physical nature --became "one with the potency from above":

Theo: you can judge for yourself. You can raise yourself to the concept--not I say, of the greatest and highest principle, because that is excluded from our considerations--but to the concept of the soul of the world, in as much as it is the act and the potency of all--omnipresent in all. And thence, finally, since there are innumerable beings, everything is one, the knowledge of this unity is the object and term of all philosophies and all natural contemplations which ascend above nature. . . .

(Bruno, Concerning the Cause, pp. 153-54)

Bruno assumes that "the knowledge of this unity" is both inherent to human nature and the object of all philosophical inquiry. His theory of immanence thus provides the principle for his linking the search for wisdom with the ascensionist impulse in The Heroic Frenzies.

Bruno published his two works on infinity in 1584. Since it is not known if Marlowe read Italian, it cannot be said with certainty that Marlowe was familiar with Bruno's ideas. But Bruno's arguments, though they are often brilliant and contain much that is original, are clearly

derivative of an important and well-established Platonist tradition. Palingenius and Digges were available to Marlowe, as was Cusa. And considering his clerical education, he was undoubtedly familiar with the theological arguments concerning infinity. Even if he heard of Bruno at second hand, Marlowe would have recognized both the implications and the contexts of his arguments. Moreover, there was a set of ideas common to the works examined here which may have influenced Marlowe as well. These ideas derive from the Hermetic texts which had been translated and made the object of serious scholarly study by the Italian Neo-Platonists. Bruno's use of these texts has been argued by Frances Yates,⁴⁵ but Bruno's interest in their applicability to conceptualizing infinity was not exclusive to him. References to the Hermetic texts run like a leitmotif through all the studies of infinity. In support of his definition of God as "infinitely extended without extension and dimension," Bradwardine quotes the pseudo-Hermetic Book of the XXIV Philosophers: "God is an infinite sphere whose center is everywhere and circumference nowhere."⁴⁶ Cusa alludes to this same line,⁴⁷ and Palingenius cites Hermes as one of his sources.⁴⁸ Many of the arguments presented in the Hermetic texts resemble the traditional discussions of infinity. The discussion of space in Asclepius, for instance, includes the argument in favor of numerous other worlds and an extra-mundane infinity. The Kosmos (universal space) "are wholly filled with bodies of various qualities and forms . . . and thus the Kosmos as a whole is full and complete." The extra-mundane is "filled with things apprehensible by thought alone, that is, with things of like nature with its own divine being."⁴⁹

The coincidence between these conceptions and those of the Christian commentators obtains as well in the discussions of God as an infinite creative will, and of divine immanence.⁵⁰ Moreover, one of the Hermetic texts, the Pymander, includes the assumption that human nature has the potential to realize this immanence:

Command thy Soul to go into India, and sooner than thou canst bid it, it will be there. Bid it likewise pass over the Ocean, and suddenly it will be there: Command it to fly into Heaven, and it will need no Wings, neither shall any thing hinder it; not the fire of the Sun, not the Aether, nor the turning of the spheres, not the bodies of any of the other stars, but cutting through all, it will ply up to the last and furthest Body. And if thou wilt even break the whole, and see those things that are without the World (if there be any thing without) thou mayest . . . If therefore thou wilt not equal thyself to God, thou canst not understand God. For the like is intelligible by the like. Increase thyself unto an immeasurable greatness, leaping beyond every Body and transcending all Time, become Eternity, and thou shalt understand God: If thou believe in thyself, that nothing is impossible, but accountest thyself immortal and that thou canst understand all things, every Art, every Science, and the manner and custom of every living thing.⁵¹

It would be tempting to assume that this passage had a formative influence on Marlowe's Tamburlaine. The correlation between extension, ascensionism, and an imitation of divinity is strikingly similar to Tamburlaine's assumptions about his own motives and potential. But to assume the Hermetic texts were of primary importance to Marlowe would distort the cultural context in which the notions of divine immanence and aspiration were embedded.

Since the effort to conceptualize the extra-mundane as an infinity co-extensive with God derived from an anti-Aristotelian bias, relied on Platonist theory, and resulted in a positive view of the human

potential, the ideas associated with divine will were particularly amenable to the intellectual and social climate of Elizabethan England. The English scientific community favored Pythagorean-Platonism over Aristotle, and the terms of the anti-Aristotelian arguments in favor of infinity shaped Digges's spatial conceptions. And just as Digges rendered concrete the metaphysical conception of infinity while retaining its theological implications, so the promoters of English expansion secularized the idea of aspiration while retaining the religious sanctity associated with it. The premises of the scientific community and of the expansionist spirit thus dovetail rather neatly with the complex of ideas connected with the debate over divine will. Although Marlowe is characterized as either an apologist for a morality based on the Ptolemaic-Aristotelian system or as confused, ambivalent, and unsystematic in his heterodoxy, the concept of infinity when considered along with the complexion of Marlowe's age, indicates that the ideas presented in Tamburlaine are neither confused nor grounded in Aristotelian physics. Tamburlaine is a study of the expansionist spirit, and the Neo-Platonist and Hermetic ideas associated with the debate over divine will provide the play its intellectual context.

The use of these elements is evident in the importance assigned by Tamburlaine to Jove. In Ficino's commentary on Philebus, Jove is identified as God's Will,⁵² and Marlowe may be associating the deity with this Platonist conception when he designates Jove as Tamburlaine's guiding principle. Jove is clearly a god of unrestrained will, and Tamburlaine embraces Jove's usurpation of his "doting father" as the "precedent" for his own behavior. He assumes that if he climbs the

"steps" by which Jove "hath scaled the heavens" he may "become immortal like the gods" (1 Tamb., I, ii, 200). Jove is identified as pure Will, stripped of the ameliorating qualities assigned to the Christian deity, and Tamburlaine seeks to imitate this divine quality.

Associated with Tamburlaine's desire to mimic divinity is the idea of divine immanence. In 1 Tamburlaine, Menaphon describes Tamburlaine as microcosm: "his piercing instruments of sight,/Whose fiery circles bear encompassed/A heaven of heavenly bodies in their spheres/That guides his steps and actions" (1 Tamb., II, i, 14-17). It is Tamburlaine, however, who offers the most complete definition of immanence. As he kills his son Calyphas, he angrily chides Jove:

Here, Jove, receive his fainting soul again,
A form not meet to give that subject essence
Whose matter is the flesh of Tamburlaine,
Wherein an incorporeal spirit moves,
Made of the mould whereof thyself consists,
Which makes me valiaunt, proud, ambitious
Ready to levy power against thy throne,
That I might move the turning spheres of heaven,
For earth and all this airy region
Cannot contain the state of Tamburlaine.

(2 Tamb., IV, ii, 36-45)

The spatial conceptions underlying this passage are similar to those in the commentaries on infinity, and provide the basis for Tamburlaine's assumptions about his own nature. Universal or mundane space--"earth and all this airy region"--is finite; the extra-mundane--where Jove has his "throne"--is co-extensive with divinity. Since Tamburlaine's "matter" is of the same nature or "mould" as Jove's, he participates in divine infinity. Therefore, he seeks to be co-extensive with the divine by ascending to Jove's "throne" in order to "move the turning spheres of heaven," because the finite world "cannot contain the state of

Tamburlaine."

Tamburlaine's ascensionist presumption is reminiscent of the passage in the Pymander that urges the listener "equal thyself to God" and promises "if thou wilt . . . see those things that are without the world (if there be anything without) thou mayest" (Pymander, pp. 97-98). Moreover, the conceptions of form and matter propounded in the Hermetic texts coincide with those offered in Tamburlaine's speech. In the Asclepius, matter is a correlative of divine potential. It "has in itself from the first the power of generating . . . all things" (Asclepius, p. 291). Matter is actualized by the imposition of form: an "uninterrupted stream of soul" is "poured into all matter. Matter has been made ready by God beforehand to be the recipient of individual forms of every shape" (Asclepius, p. 313). Matter is thus identified with potential or will, and form (soul) with act. The two attributes constitute God's immanence in creation, and because he is comprised of both, man has the potential to become "like the gods" (Asclepius, p. 295).

While the connections made in the Asclepius between form, matter, and immanence are similar to those in Tamburlaine's speech, they are themselves derivative of Platonic conceptions. An understanding of how the Renaissance received these Platonic ideas can be gained from Ficino's commentaries on Plato, and from Bruno. In the commentary on Philebus, Ficino remarks that "universal matter" is "infinite material" and "comes from God as the infinite, so that from God's infinity comes the infinity of matter" (Ficino, p. 388). Although the form imposed on matter also derives from the divine, matter participates most fully in

God because it is infinite while form is limiting: "Therefore universal matter, like some shadow, follows after God who is fleeing away" (Ficino, p. 388). Matter can never unite with the divine; instead, it is essential potency, requiring finite form for act. Without form, matter is inchoate and passive (Ficino, pp. 388-90).

This latter consideration led Bruno to redefine the Platonic Divine Intellect that "infuses" form into matter as the "inner artificer" that "shapes matter from within" (Bruno, Concerning the Cause, p. 112). In order to argue that God necessarily created an infinite world because He could do so, Bruno had to argue that there was no distinction between potential and act. He therefore dismisses the Platonic assumption that potential is equal to passivity: "This potency does not indicate weakness in that of which it is said, but rather confirms its virtue and efficacy; and at the end is found to be all one and indeed the same thing as active potency" (Bruno, Concerning the Cause, pp. 138-39). Therefore, matter and form--or potential and act--are equally conjoined: "If the form . . . is of simple and of invariable essence . . . it will have to be in the perpetual potency of matter--which is a potency indistinct from act" (Bruno, Concerning the Cause, pp. 157-58).

Tamburlaine's speech seems to draw upon various aspects of these concepts of form and matter. Matter is that "incorporeal spirit" derived from divinity. It makes Tamburlaine "valiaunt, proud, ambitious" and "ready to levy power" against Jove. Matter, therefore, is conceived as an active potency, but it is not the same thing as act. Tamburlaine complains that in giving him Calyphas, Jove has provided "a form not

meet to give that subject essence/Whose matter is the flesh of Tamburlaine." Later in this same speech, Tamburlaine condemns Jove for "sending to my issue such a soul,/Created of the massy dregs of earth/The scum and tartar of the elements" (2 *Tamb.*, IV, ii, 46-47). While Tamburlaine does not assume that matter is passive potency, he acknowledges that it requires an appropriate form.

Since matter is an active potency derived from the infinite Will, extension is its natural manifestation. Tamburlaine suggests one consequence of this when he declares his desire to ascend to the extra-mundane because he cannot be contained by the finite world. He suggests a further consequence when he comforts his sons who grieve as they watch him die: "But, sons, this subject, not of force enough/To hold the fiery spirit it contains,/Must part" (2 *Tamb.*, V, iii, 168-69). His "fiery spirit," like the "incorporeal spirit" of the earlier speech, is equated with matter, and Tamburlaine assumes that his "subject" (or corporeal form) can no longer "contain" it. In both speeches, the description of spirit or matter overflowing or breaking constraints derives from the conception of matter as that part of the human character which participates in an infinitely extended divine will. Matter, to use Ficino's phrase, "like some shadow, follows after God who is fleeing away" (Ficino, p. 388). The divine is infinitely extended, and matter but for the constraints placed upon it by form would also be infinitely extended. Since matter is for Tamburlaine active potency, he is necessarily compelled to extend himself infinitely, seeking to go beyond the finite world which cannot contain him, until matter finally breaks the constraints imposed by form and he dies.

Tamburlaine's aggressiveness thus derives from his participation in divine will, and assumes the proportions of a natural compulsion. Tamburlaine's insistence upon conquering uncivilized lands, on extending his power into the unknown, is an expression of this compulsion. The act of conquest is more important than the titles it brings because the act is the manifestation of his spiritual potency. Tamburlaine articulates this compulsion to Zenocrate in answer to her question, "When wilt thou leave these arms/And save thy sacred person free from scathe/And dangerous chances of the wrathful war?" Tamburlaine answers: "When heaven shall cease to move on both the poles,/And when the ground whereon my soldiers march,/Shall rise aloft and touch the horned moon,/And not before, my sweet Zenocrate" (2 Tamb., I, iv, 12-15). His answer suggests his aggression is tantamount to a natural law, since he can no more refrain from war than the heavens can stand still or the earth move. When he gives a similar self-characterization to the four Arabian suzerains, he clarifies the correlation between his aggressive compulsion and divine will: "till by vision or by speech I hear/Immortal Jove say 'Cease, my Tamburlaine,'/I will persist a terror to the world" (2 Tamb., IV, ii, 124-26). Whether characterized as a divine imperative or as natural law, Tamburlaine's aggressiveness is an irresistible drive to extension, compelling him to covet Mexico and Antarctica as well as Persepolis.

Tamburlaine's confidence that his aggression results from the divinity immanent in his spirit leads him to assume he is equal to the gods. Since he participates in infinity, he cannot conceive of himself as inferior to Jove, and when Zenocrate dies he orders Casane and

Theridamas to "raise cavalieros higher than the clouds,/And with cannon break the frame of heaven,/Batter the shining palace of the sun,/And shiver all the starry firmament,/For amorous Jove hath snatched my love from hence" (2 Tamb., II, iv, 103-07). Similarly, when he falls fatally ill, he tells Techelles: "Come, let us march against the power of heaven" (2 Tamb., V, iii, 47). Although Tamburlaine is obviously raving in both passages, his presumption is consistent with the informing principle of his character. His "incorporeal spirit" seeks infinite extension, and compels Tamburlaine, as Hermes advises in the Pymander, to equal himself to God.

Possessed of an active spirit, Tamburlaine seeks to realize his full potential. This compulsiveness leads him towards infinite extension, and consequently renders his identity Protean. Since he seeks through finite act to define his infinite potential, he can never be definitively identified by his acts. For the terms of his identity, Tamburlaine relies on titles given to him by others as a result of their responses to his actions. In Tamburlaine's first appearance, he asks Zenocrate if she is betrothed. Her answer provides Tamburlaine a title: "I am my lord, for so you do import." Tamburlaine accepts Zenocrate's identification of him: "I am a lord, for so my deeds shall prove" (1 Tamb., I, ii, 34-35). Tamburlaine then removes his shepherd's clothes to reveal his armor. The gesture demonstrates how essential it is for Tamburlaine to define himself by action, and like the exchange with Zenocrate, it indicates the extent to which Tamburlaine's identity depends upon the way he is perceived by others. Similarly, when Tamburlaine tempts Theridamas to betray Mycetes, he says, "Join with me

now in this my mean estate--/I call it mean because, being yet obscure,/The nations far removed admire me not" (1 Tamb., I, ii, 201-03).

Tamburlaine accepts "mean" and "obscure" as descriptives because they are the terms in which he is perceived by "nations far removed."

To provide himself an identity, Tamburlaine embraces the titles of those he confronts. He hears Menaphon say to Cosroe, "Your majesty shall shortly . . . ride in triumph through Persepolis." Tamburlaine contemplates the suitability of this ceremony for himself: "And ride in triumph through Persepolis! Is it not brave to be a king, Techelles? Usumcasane and Theridamas,/Is it not passing brave to be a king,/And ride in triumph through Persepolis?" (1 Tamb., I, v, 50-54). Tamburlaine also observes the necessary correlation between his compulsive spirit and his desire to invest himself with Cosroe's titles:

Why then, Casane, shall we wish for aught
The world affords in greatest novelty
And rest attemptless, faint, and destitute?
Methinks we should not. I am strongly moved,
That if I should desire the Persian crown,
I could attain it with wondrous ease.
(1 Tamb., II, v, 72-77)

Confident that for him will and act are indistinguishable, Tamburlaine cannot resist taking the crown once he desires it. He is compelled to possess what "the world affords in greatest novelty"; to do otherwise would countermand his natural impulses, forcing him to "rest attemptless, faint, and destitute." Tamburlaine is thus obliged to seek Cosroe's crown, and to identify himself as the Persian king.

Tamburlaine's identification of himself through his actions is demonstrated again when he meets Bajazeth, who is insulted by Tamburlaine's bluntness: "Kings of Fez, Morocco, and Argier,/He calls

me Bajazeth whom you call lord!" Tamburlaine replies: "And know thou, Turk, that those which lead my horse,/Shall lead thee captive through Africa,/And dar'st thou bluntly call me Tamburlaine?" (1 Tamb., III, iii, 73-75). Tamburlaine gives himself a proleptic identity, one which depends for its realization upon his defeat of Bajazeth. He justifies his war against Bajazeth by accepting another derivative title: "I that am termed the scourge and wrath of God,/The only fear and terror of the world,/Will first subdue the Turk, and then enlarge/Those Christian captives which you keep as slaves" (1 Tamb., III, iii, 44-47). The term "scourge," like "lord" and "obscure," is adopted by Tamburlaine because it reflects the manner in which he is perceived by others. And as his exchange with Bajazeth demonstrates, the appropriateness of the terms Tamburlaine adopts is demonstrable only after he has acted. The title "lord" he accepted contingent upon future acts--"for so my deeds shall prove"; his title as king depends upon the defeat of Cosroe; his title as scourge depends upon his defeat of Bajazeth. And after that defeat, Tamburlaine appropriates Bajazeth's identity: "Thy names and titles and thy dignities/Are fled from Bajazeth and remain with me" (1 Tamb., IV, ii, 79-81). He willingly embraces the identity as scourge, as well as Bajazeth's titles, since his identification by others depends upon it: "The ages that shall talk of Tamburlaine/Even from this day to Plato's wondrous year,/Shall talk how I have handled Bajazeth" (1 Tamb., IV, ii, 94-96).

Tamburlaine's identity necessarily alters. He expresses his infinite potential through finite acts, and since his actions are never a sufficient manifestation of his potential, Tamburlaine can never be

definitively identified. His undefinable nature is thus a feature of divine immanence. A similar expression of the relationship between immanence and identity is found in Asclepius: "the man who, in virtue of the mind in him through which he is kin to the gods, has attached himself to them by pious devotion, becomes like to the gods; he who has attached himself to daemons becomes like to the daemons . . . (Asclepius, p. 295). In the "Oration on the Dignity of Man," Pico della Mirandola raises the Hermetic concept of shifting identities to the sine qua non of human nature. He argues that after God had created the world and everything in it, He had no remaining "archetype" or form for man. God therefore had to grant man unlimited potential without the constraints of form. Man alone has the freedom "unimpeded by any such limits" to freely establish "the features" of his own nature.⁵³ This sinecure of divinity gave man the ability to determine his own identity:

it was man alone, at the moment of his creation, that God bequeathed seeds laden with all potentialities--the germs of every form of life. Whichsoever of these a man cultivates will mature and bear fruit within him; if vegetative, he will become a plant; if sensitive, a brute; if rational, he will discover himself a heavenly being; if intellectual, he will be an angel and the son of God.

(Pico della Mirandola, p. 143)

Pico exclaims in admiration over "this our chameleon," (Pico della Mirandola, p. 144) and urges his listeners to pursue a "holy ambition" which will allow them to identify themselves with God (Pico della Mirandola, p. 146). Understood in this context, Tamburlaine's shifting identity is an essential feature of his characterization as one whose "incorporeal spirit" is co-extensive with an infinite divine will. His unlimited potential, that part of him associated with matter, compels

him to act, and to seek infinite extension. Since he is "laden with all potentialities," his nature is necessarily Protean, and while he embraces as his own the various identities his will compels him to desire, he cannot achieve a fixed identity.

Tamburlaine's fluid identity, his conquests, and his confidence that he is equal to the gods are all details of a unified portrait. Underlying his characterization is the conception of an infinite divine will immanent in human nature. Since Tamburlaine's spirit actively participates in the divine, and seeks to be co-extensive with it, he is compelled to extend his power into unknown regions, and to desire ascension into the extra-mundane. Tamburlaine's portrait rather clearly derives its texture from the Platonist effort to define God as unconstrained Will. But while the debate over metaphysical infinity posited the immanence of divinity in human nature, it did not condone aggressive self-aggrandizement. This feature of Tamburlaine's portrait derives from the expansionist spirit of the Elizabethan age. The depiction of Tamburlaine's aspiration thus involves elements of both the secular and the religious. Tamburlaine's character unifies these elements, and presents a picture of the limitless potential of the human spirit active in the material world.

This aspect of Tamburlaine's character is qualified, however, by the suggestion that he is the instrument of destiny. Tamburlaine assumes the course of his life was determined at his birth by beneficent natal stars. The first character to mention this is Meander, who reports to Mycetes that the encroachments into Persian territory result from Tamburlaine's "hoping misled by dreaming prophecies,/To

reign in Asia, and with barbarous arms/To make himself the monarch of the East" (1 Tamb., I, i, 41-43). Tamburlaine later confirms Meander's report. After Cosroe makes him an ally, Tamburlaine assures Cosroe his confidence is not misplaced: "And so mistake you not a wit, my lord,/For fates and oracles of heaven have sworn/To royalize the deeds of Tamburlaine,/And make them blessed that share in his attempts" (1 Tamb., II, iii, 6-9). Tamburlaine assumes his natal stars were particularly portentous: "For 'will' and 'shall' best fitteth Tamburlaine,/Whose smiling stars give him assured hope/Of martial triumph, ere he meets his foes" (1 Tamb., III, iii, 40-43). Tamburlaine is not alone in believing his natal stars endowed him with special powers. Ortygius praises Cosroe's wisdom (prematurely, as events disclose) in soliciting Tamburlaine's assistance: "In happy hour we have set the crown/Upon your kingly head, that seeks our honor/In joining with the man ordained by heaven/To further every action to the best" (1 Tamb., II, i, 50-54). Even Bajazeth feels compelled to acknowledge the influence of Tamburlaine's stars:

Ah, fair Zabina, we may curse his power,
The heavens may frown, the earth for anger quake,
But such a star hath influence in his sword
As rules the sky and countermands the gods
More than Cimmerian Styx or Destiny.
(1 Tamb., II, i, 50-54)

His natal stars give Tamburlaine the confidence that he enjoys Jove's special protection. He warns Theridamas: "Draw forth thy sword, thou mighty man at arms,/Intending but to raise my charmed skin,/And Jove himself will stretch his hand from heaven/To ward the blow and shield me safe from harm" (1 Tamb., I, ii, 177-79). He is equally

confident of Jove's concern for him when he answers Bajazeth's curses: "The chiefest god, first mover of that sphere/Enchased with thousandes ever shining lamps,/Will sooner burn the glorious frame of heaven/Than it should so conspire my overthrow" (1 Tamb., IV, ii, 9-12). He also assumes Jove guarantees him an apotheosis. Tamburlaine says his sons will rule in his stead "If Jove, esteeming me too good for earth,/Raise me to match the fair Aldeboran/Above the three fold astracism of heaven,/Before I conquer all the triple world" (2 Tamb., IV, iv, 60-64).

Jove is assigned a paternal function in these passages. He, like the stars, governs and protects Tamburlaine. As a result, Tamburlaine assumes he is the special instrument of Jove's providence:

these terrors and these tyrannies--
I execute, enjoined me from above,
To scourge the pride of such as heaven abhors;
Nor am I made arch-monarch of the world,
Crowned and invested by the hand of Jove,
For deeds of bounty or nobility;
But since I exercise a greater name,
The scourge of God and terror of the world,
I must apply myself to fit these terms,
In war, in blood, in death, in cruelty,
And plague such peasants as resist in me
The power of heaven's eternal majesty.
(2 Tamb., IV, ii, 71-84)

Although Tamburlaine originally accepted the identity as scourge because it was a term applied to him by others ("I that am termed the scourge of God" [1 Tamb., III, iii, 43]), he here assumes that his identity has been determined by Jove. His earlier acceptance of the term was contingent upon his own efforts to provide himself an identity through his actions. He assumed that he could become whatever he wished: "if I should desire the Persian crown,/I could attain it" (1 Tamb., II, v, 76-77). In this passage, he maintains his identity has been imposed

upon him. His "terrors" and "tyrannies" are "enjoined" on him, since he is "crowned and invested by the hand of Jove." When he spoke of acquiring his own identity, Tamburlaine assumed his compulsiveness derived from his own will; here, it is imposed upon him: "I must apply myself to fit those terms." Tamburlaine's self-characterizations therefore contradict themselves. He believes at times that his "incorporeal spirit," because it participates in the divine, allows him the free exercise of his will; at others, he asserts his actions are part of providential plan, and are imposed upon him.

The presentation of Tamburlaine as a divine instrument is as consistent as the countervailing treatment of his unlimited will. Tamburlaine assumes he is governed by his natal stars, which forecast the role he would play in history. The role assigned him is that of a scourge who whips "the pride of such as heaven abhors." Battenhouse has interpreted Tamburlaine's role as scourge to mean that he is intended by God to correct wickedness until God destroys him. This interpretation of Tamburlaine as an instrument of divine retribution was available to Marlowe in the sources, but those sources that mention Tamburlaine's role as scourge generally see it as applicable to Tamburlaine's defeat of Bajazeth, who had besieged the Christians at Constantinople.⁵⁴ While it is true that Marlowe's Tamburlaine does not identify himself as a scourge until he confronts Bajazeth, he continues to use the term after its applicability as a sign of retributive justice. In the passage just quoted, for instance, Tamburlaine uses the identity as scourge to justify his murdering Calyphas. Battenhouse seems to answer this difficulty by arguing that Tamburlaine is correct in assuming that

he functions as a scourge when he defeats Bajazeth, since Bajazeth, Mycetes, and Cosroe "suffer deserved punishment"; but his later use of the term indicates Tamburlaine has been siezed by "an obsession" which signals the "increasing madness" brought upon him by his own ambition (Battenhouse, p. 256). This latter behavior, culminating in Tamburlaine's illness, indicates that "God is now casting his Scourge into the fire" (Battenhouse, p. 257).

While Battenhouse's interpretation gives Tamburlaine's identification as scourge a theological context, it is not without its difficulties. Since he assumes the scourge is an instrument of retributive justice, Battenhouse is obliged to argue that the kings Tamburlaine defeats are morally culpable. He therefore argues that Mycetes was justly defeated, for what sins Battenhouse does not mention, despite the fact that Tamburlaine does not use the term scourge when he confronts Mycetes. He uses it for the first time when he meets Bajazeth. Moreover, if Tamburlaine is correct in assuming that Mycetes, Cosroe, and Bajazeth deserved punishment, but is wrong when he assumes that others deserve it as well, then God has clearly given His scourge a great deal of freedom, allowing Tamburlaine to punish the wicked as well as the innocent. Such an assumption contradicts Battenhouse's argument that as Marlowe uses it the concept of the scourge "implies justice in the oppressor and wickedness in the victim" (Battenhouse, p. 148).

This definition of the scourge as an instrument of retributive justice was obviously available to Marlowe. Sir Thomas More, for instance, uses the scourge in this sense when he speaks of the trouble caused by Protestants:

And all the myscheyef shall be theyr owne at lengthe,
 though God for our synne suffer them for a scourge to
 prevayle in some places here and there for a whyle;
 whom upon mennes amendement he wyll not fayle to serve
 at the last, as doth the tender mother, whyche, when
 she hath beten her chylde for his wantoness, wypeth
 hys eyen and kysseth hym, and casteth the rod into
 the fire.⁵⁵

More identifies the scourge with divine retribution. The Protestants will beleaguer the Catholics, who deserve it, until God like a forgiving parent, "casteth the rod into the fire."

By the time Marlowe wrote Tamburlaine, however, the use of the scourge to signify retributive justice had changed. As we have noticed, the Protestant interpretation of history assumed that when the gospel was correctly preached, the anti-Christ would come in order to cruelly martyr the zealous. At least one writer of the period says that in this capacity the anti-Christ will function as a scourge. Writing in order to elaborate upon his brother's doomsday pamphlet, John Harvey, in a work which interestingly enough includes a translation of Hermes Trismegistus' Iatromathematica (1583), offers his interpretation of the conjoining of Jupiter and Saturn:

Wherefore if I may freely utter, that which I astrologically conceive, I imagine that some prophane helhound, some fierce and cruel Antichrist, some outrageous and irreligious Mahomet, some Turkish Martial Tyrant shall arise, who will play the second Athila or Totilas, by scourging the zealous people of God, who will furiously assault the holy citie of Ierusalem, who will violently oppresse and horribly torment the inhabitants of that blessed Cittie. And shall not then Iniquitie have the upper hande?

(Harvey, p. 12)

Harvey's conception of a scourge, although it includes the idea of providential action, does not embrace retributive justice; instead, the

scourge torments those who are not morally culpable. Moreover, the description of the scourge as "an irreligious Mahomet, some Turkish Martial Tyrant" and "the second Athila" may be an oblique reference to the historical Tamburlaine, since the moral histories of the period often linked Attila and Tamburlaine in their discussion of divine scourges.⁵⁶ Harvey may just as likely be referring to the Turkish encroachments into Europe during the fifteenth century, however, since many tracts of this type associated the Turkish invasion with one manifestation of the anti-Christ.⁵⁷

Whether or not Harvey refers to the historical Tamburlaine in this tract, his discussion of the scourge provides a context for understanding Tamburlaine's character. It is unnecessary to conclude that Tamburlaine conceives of himself as an instrument of divine retributive justice when he asserts that Jove has invested him with the title of scourge. Although Tamburlaine maintains his role is "to scourge the pride of such as heaven abhors," he is not referring to a Christian deity who desires that the wicked be punished. Tamburlaine persistently characterizes Jove as a god of power and in context it appears that "heaven abhors" not the wicked but the weak. Tamburlaine uses the term scourge, as does Harvey, to designate aggressive action undertaken as part of a predetermined divine plan. Moreover, since Tamburlaine uses the term scourge as a synonym for "terror of the world," he suggests that he perceives his role to be one of indiscriminate aggression.

Harvey's tract was one of the many that were written to explain that the unusual conjunction of Saturn and Jupiter in 1583 signalled the end of the world. John Harvey is more moderate in his predictions

than his brother Richard, but his reference to the anti-Christ hints the end is near. Tamburlaine assumes his natal stars foretold a future that is realized in his serving as Jove's scourge. Moreover, the natal stars were of an unusual configuration. He explains that at his birth "Heaven did afford a gracious aspect,/And joined those stars that shall be opposite/Even till the dissolution of the world,/And never meant to make a conqueror/So famous as mighty Tamburlaine" (2 Tamb., III, v, 80-84). His language echoes that in the doomsday pamphlets of 1583. Richard Harvey explains that the conjoining of any two superior planets inevitably signals a radical disruption. The most portentous sign occurs when the superior planets Saturn and Jupiter cross out of a watery and into a fiery sign. This particular conjunction has occurred only twice before--five years prior to the birth of Christ, and during the reign of Charlemagne--"but is now to happen once again in the present yere 1583. Touchinge which, forasmuch as it is the last coniunction that euer shall happen in the end of the watrie Trigone, I am Astrologically induced to this cōiecture, that we are most likely to have a new world, by some sodaine, violent, and wonderful strange alteration" (Richard Harvey, p. 38). Tamburlaine's natal stars are similarly portentous, since they will not so conjoin again "Even till the dissolution of the world."⁵⁸

The correlation between Tamburlaine's natal stars, the paternal protection of Jove, and Tamburlaine's role as scourge suggests that Tamburlaine's astrological signs portended the birth of a figure who would assume the proportions of an anti-Christ like the one envisioned by John Harvey. This does not mean that Tamburlaine is the anti-Christ.

Jove is clearly not Christ and the context of the play is not Christian. But the pattern of the anti-Christ helps define Tamburlaine's character. His coming is foretold by a unique configuration of planets and is part of a providential plan which includes the use of a scourge afflicting those who are not morally culpable. Those parts of the play which present Tamburlaine's role as a divine instrument therefore suggest that his identity does not arise out of the tension between unlimited potential and finite act, but is imposed upon him by extrinsic forces, and the identification as scourge contradicts Tamburlaine's belief that he is motivated by forces intrinsic to his nature.

These contrasting ideas weave the pattern of the limitless and the limiting. On the one hand, Tamburlaine characterizes his behavior as arising out of his participation in an infinitely extended divine will. His potential is unlimited, his identity Protean. On the other hand, he asserts that his behavior results from a paternalistic deity using him as an instrument of providence. His role is "enjoined" upon him, his identity invested in him by Jove. This contradiction is not resolved. The predominant imagery in the play--the solar metaphor--insists upon rather than reconciling these differences. The imagery is used to elucidate Tamburlaine's career, his attitude towards his own potential, his relationship towards Jove, and his hopes for his sons, but rather than unifying the various elements of his character, the imagery helps define their differences more sharply.

Not only does the solar metaphor provide the pattern by which Tamburlaine understands his career, it also provides him an identity. While the titles lord, king, and scourge are derivative, Tamburlaine's

role as a sun-king is self-invested, and his conception of himself as solar analogue embraces both the limitless and limiting elements of his identity. Tamburlaine uses solar metaphor to define both his sense of self-motivation, and his belief that he is governed by a higher power. At times, the comparison justifies his willfulness and his presumption of equality with the gods; at others, it explicates his belief that he participates in a providential design.

Since the play deals with Tamburlaine's career, the solar metaphor rather clearly informs the dramatic structure. Several critics have observed the correlation between Tamburlaine's westward march and the diurnal movement of the sun.⁵⁹ Tamburlaine begins in the east, defeating a weak enemy. As he confronts increasingly formidable enemies, he gains strength from each victory, until his presence alone is enough to scatter his enemies "like summer vapors vanished by the sun" (2 *Tamb.*, V, iii, 116). But like the sun, Tamburlaine must decline and the play therefore ends with his death. This assessment of the play's structure is reinforced by Tamburlaine's appreciation of his career. We have noticed that in his first appearance, Tamburlaine declares he will "measure the limits of his empery/By east and west/As Phoebus doth his course" (1 *Tamb.*, I, ii, 40-41). At the end of the play, as he describes on a world map his westward march, he regrets he cannot complete what he has begun and follow the sun around the world:

see what a world of ground
Lies westward from the midst of Cancer's line
Unto the rising of this earthly globe,
Whereas the sun, delining from our sight
Begins the day with our antipodes
And shall I die and this unconquered?
(2 *Tamb.*, V, iii, 145-50)

Tamburlaine expresses his frustration that his will cannot realize its full potential, and the solar metaphor articulates the tension between Tamburlaine's unlimited will and his finite actions. But it exemplifies as well Tamburlaine's sense that even in death he is participant in a divine plan. As with the sun, Tamburlaine is compelled by divine impetus to move from east to west until his strength fades. The solar metaphor therefore conceptualizes both Tamburlaine's sense that he is self-motivated, and his belief that his behavior and identity are imposed on him.

In addition to elucidating his career, the solar metaphor underscores Tamburlaine's sense that he is equal with the gods. Astronomers of the period assumed the sun illuminated the stars as well as the planets,⁶⁰ and astrologers consequently assumed the sun exerted a substantial influence. Tamburlaine makes the same assumption. He does not, however, assume he is like the sun in a metaphoric sense; rather he asserts that he is a second sun whose potency exceeds the first:

Smile stars that reigned at my nativity,
And dim the brightness of their neighbor lamps;
Disdain to borrow light of Cynthia,
For I, the chiefest lamp of all the earth,
First rising in the east with mild aspect,
But fixéd now in the meridian line,
Will send up fire to your turning spheres,
And cause the sun to borrow light of you.

(1 Tamb., IV, ii, 30-35)

Tamburlaine here identifies himself as a sun-king. While he acknowledges that he is governed in this capacity by his natal stars, he emphasizes his own influence on them. Tamburlaine is not here identifying himself with the sun; he is the "chiefest lamp of all the earth," not the world. His march of conquest is like the sun's movement from east to west, but

he is more potent than the sun, for he will so illuminate his natal stars that the sun will "borrow" its light from them. Tamburlaine's assertion explicitly denies his own inferiority or subordination to stellar powers, and implicitly denies the conception of natural hierarchy.

Tamburlaine makes a similar comparison when he speaks of Zenocrate's influence. He laments her death by observing that the loss of her light has darkened the world:

Black is the beauty of the brightest day;
The golden ball of heaven's eternal fire,
That danced with glory on the silver waves,
Now wants the fuel that inflamed his beams,
And all with faintness and for foul disgrace,
He binds his temples with a frowning cloud,
Ready to darken earth with endless night.
Zenocrate, that gave him light and life . . .
Draws in the comfort of her latest breath.
(2 Tamb., II, iv, 1-8; 13)

Tamburlaine does not compare Zenocrate to the sun, but assumes the sun derives its light from her. Later in this scene he reiterates his conception of Zenocrate as one who "gives light" to the sun, moon, and fixed stars. He makes a similar comparison as he struggles to decide whether to war against Zenocrate's father. Zenocrate's effect on him derives from her power to illuminate "the moon, the planets, and the meteors" (1 Tamb., V, iii, 87). Nor is Tamburlaine the only lover to compare his beloved with the source of universal light. Theridamas laments Olympia's death by observing the earth has lost "a greater lamp than that bright eye of heaven,/From whence the stars do borrow all their light" (2 Tamb., IV, iv, 88-89).

The consistency of the second sun metaphor is particularly

interesting. It is always invoked to suggest that a character is not inferior or subordinate to extra-terrestrial influences. Thus while Tamburlaine acknowledges he is influenced by his natal stars, he asserts the influence is reciprocal, since he is more potent than the sun. A similar insistence upon reciprocity and the denial of hierarchal subordination is found in Cusa and derives from his argument that divine nature is infinite. Since God is the center and circumference of all things, all things participate equally in Him. The planets (including the earth, sun, and moon) are similarly composed of a center surrounded by regions of air, water, and fire. Terrestrial inhabitants see this fiery region when they look at the sun; and if someone were outside the terrestrial fiery sphere, the earth would appear "as a bright star" (Cusa, pp. 112-13). The earth, sun, moon and stars are all self-illuminated, and since stellar bodies exert their influence through their light, the earth influences the stars as well as being influenced by them: "The earth, then, is a brilliant star having a light, heat, and influence distinctively its own and different from those of all other stars, just as each star differs from every other in light, nature and influence" (Cusa, p. 113). Cusa's assumption that the earth is not inferior to other stars, but participates in a reciprocal influence, is similar to Tamburlaine's confidence that both Zenocrate and he exert a dominating influence on the sun, stars, meteors. The second sun metaphor is therefore consistent with Tamburlaine's assumption that he is equal with the gods because he participates in infinitely extended will. The second-sun metaphor conceptualizes the world as non-hierarchal.⁶¹ The stars and planets are composed of like nature and are self-illuminated;

each gives and receives light and influence. But some are of greater magnitude and influence. The sun is the "chiefest lamp" until Tamburlaine exerts his superior power and the sun is illuminated. Therefore, Tamburlaine urges his stars to reflect his superior light and influence.

The Apollo-Phaeton myth is sometimes used to exemplify similar assumptions. In the speech in which he identifies himself as a sun-king, Tamburlaine equates his destructive potential with Phaeton's: "As was the fame of Clymene's brain-sick sun/That almost brent the axle-tree of heaven,/So shall our swords, our lances, and our shot/Fill all the air with fiery meteors" (1 Tamb., IV, ii, 30-35). Tamburlaine would willingly threaten the earth as did Phaeton, and his failure to attach any negative connotation to Phaeton's disobedience indicates again Tamburlaine's confidence that he is self-motivated and subservient to no higher authority.

But he invokes the Apollo-Phaeton myth for a different purpose when he is dying. He asks his son Amyras to mount the chariot drawn by the "pamper'd Jades." Amyras in so doing becomes an icon for Phaeton, but Tamburlaine urges him not to follow the example of Apollo's disobedient son:

then learn with awful eye
To sway a throne as dangerous as his;
For if thy body thrive not full of thoughts
As pure and fiery as Phyteus' beams,
The nature of these proud, rebelling jades
Will take occasion by the slenderest hair
And draw thee piecemeal, like Hippolytus,
Through rocks more steep and sharp than Caspian cliffs.
(2 Tamb., V, iii, 234-241)

Tamburlaine here identifies himself with Apollo, and while he earlier used the myth to express willfulness, independence and a desire to destroy the natural order, he here urges constraint and order as necessary to self-preservation.

Tamburlaine's advice is consistent with his mood as he dies. At first angered by the face of Death, Tamburlaine accepts it as a sign of Jove's paternal protection: "In vain I strive and rail against those powers/That mean t'invest me with a higher throne,/As much too high for this disdainful earth" (2 *Tamb.*, V, iii, 120-22). His belief that he is governed by a paternal deity who invests him with his identity gives Tamburlaine a context for comprehending his own death. His associating himself with Apollo is one manifestation of this belief. Apollo is a powerful god, but his role is governed by another, and fulfills a divine and orderly plan.

Tamburlaine uses solar imagery to elucidate his contradictory assumptions about his nature. The analogy between Tamburlaine's westward march and the diurnal movement of the sun illustrates the belief that his potential is constrained only by the finite nature of his actions, and his assumption that he is merely the instrument of Jove. The second sun metaphor allows Tamburlaine to express his confidence that he is not subordinate to any higher power, while the Apollo-Phaeton metaphor, as employed at his death, suggests his identity is governed by Jove whose providential design he fulfills.

As it is used in the play, the sun is a symbol for both infinite power and controlled action. A similar conception of the sun is offered in Ficino's Concerning the Sun.⁶² We have noticed the contribution made

by the sun-worship of the Neo-Platonists to the acceptance of heliocentricity, and in this work, Ficino concisely articulates the reasons for this solar adoration. He declares, "The sun regulates and guides all things celestial, like a veritable lord of the sky" (Ficino, Concerning the Sun, p. 121). The dominance of the sun makes it analogous to God, and in developing the parallel, Ficino argues that the sun makes manifest the infinite divine will:

When Plato says that the sun goes beyond all that is visible, he alludes without doubt to something beyond the corporeal. He alludes to a Sun which is incorporeal --that is, to the divine Intellect. Since, however, one can ascend from the image to the model, illuminating all that has value, one can ascend from the image to the model, eliminating all that is less perfect and adding all that has value, one can take away from the sun . . . every determinate quantity. Yet power, in addition to light, can be left with it; so that the light can remain endowed with a marvelous power; not encompassed within any definite quantity or figure; extended in an infinite space, while yet filling the macrocosm with its omnipresence.

(Ficino, Concerning the Sun, p. 130)

Take away its corporeality, and the sun becomes infinitely extended power manifested as light. It is pure potential unconstrained by form. Ficino's conception of the sun as a manifestation of infinite power is similar to that found in Tamburlaine's use of the second sun metaphor, since that metaphor is associated with Tamburlaine's confidence that he is equal to the gods and derives from the suggestion that Tamburlaine participates in an infinitely extended divine will.

Ficino avoids, however, the suggestion that the sun is the equivalent of God. He carefully rehearses the constraints placed on the sun:

The power of the Principle, being infinite, touches everything and is held back by nothing. The power of the Sun, on the contrary, operating as it does through rays is impeded in various ways by whatever obstacles are opposed to them. Its strength is weakened by opposition to the Moon, and it is also many times held back by the clouds. Furthermore, it is stopped by the density of the earth, and its rays are lessened by spatial distances. The Sun itself is nothing but a small part of the world, enclosed within a narrow space, drawn in every way by its own sphere, and is constantly pushed back by the higher sphere against the motion of its own. It is impeded by contrary stars and adverse stars, and is at times, if I may say so, weakened by malignant configuration.

(Ficino, Concerning the Sun, p. 140)

While he earlier identifies the sun as a manifestation of infinite power, Ficino here characterizes it as "nothing but a small part of the world" pushed and pulled by the forces which govern it. Again, the parallel with Tamburlaine is evident. The analogy between Tamburlaine's westward march and the sun, as well as his final identification with Apollo, suggests that he is an instrument of providence, governed by higher forces, and compelled to act as he does.

As the similarities between Ficino's description of the sun and Tamburlaine's suggest, Marlowe's portrait of the aspiring hero is not based on a morality buttressed by Aristotelian physics; rather, the intellectual context of Tamburlaine is derived from the same source that fostered Elizabethan expansionism. Both Tamburlaine's sense of his unlimited potential and his countervailing belief that his will is subordinate to Jove reflect the particular treatment accorded Neo-Platonist conceptions by Elizabethan mathematicians. While their biases were decidedly Platonic, they were not content with purely metaphysical or "imaginary" conceptions of the world. They tested Platonist theory

against the operations of physical nature. One consequence of this tendency was that the Platonist arguments in favor of an infinite divine will led to an alteration in the conception of physical space and contributed to the idea that both the material world and human nature were implicated in divinity. Tamburlaine's belief that he is possessed of a will co-extensive with an infinite divine will, his anti-hierarchal conceptions, and his use of solar imagery to express his sense of unlimited potency reflect the scientific interest in examining the physical implications of metaphysical infinity.

This interest in a physical demonstration of Platonist premises influenced astrology as well as practical mathematics. The astrologers argued that their predictions, with the complicated mathematics they required, derived from the same Pythagorean-Platonist theories used by practical mathematicians, many of whom were also astrologers. They combined their Platonist premises and the physical evidence provided by stars, novas, comets, and eclipses to elucidate the theological conception of providence. Tamburlaine's assumption that he is governed by an extraordinary natal horoscope, the Protestant overtones of his role as scourge, and his belief that he is participant in a divine plan echo the arguments offered by astrologers in the doomsday pamphlets.

Thus while science provided both the technic and the rhetoric essential to the promotion of English expansion, it also fostered contradictory views about the human condition. Since Tamburlaine includes both conceptions, and develops both with equal consistency, the play is perfectly ambiguous, and it is necessary to assume that the ambiguity is part of the play's artistic design. The modern response to the play

is not the result of either Marlowe's ambivalence or a failure to properly appreciate the Elizabethan attitude towards ambition. It derives from the dramatic design. In portraying the aspiring hero, Marlowe presents a hero who characterizes himself in contradictory terms, perceiving himself as both self-willed and governed; as independent and controlled. Since the manner in which Tamburlaine perceives himself gives rise to ambiguity, the central issue in Tamburlaine is the problem of self-knowledge. The play does not ask the audience to decide on the moral implications of ambition; nor does it offer a brief for human aspiration. The play examines how imagination functions to create metaphysical justifications for the impulses of the will. Marlowe's presentation of the aspiring hero is the exposition of an epistemological problem, and an awareness of that problem is essential to understanding the play.

III

Tamburlaine examines the creative and transforming power of the imagination and demonstrates that reality consists not of what the characters know, but of how they know it. Tamburlaine suggests the crucial creative function of the imagination in his first appearance. He acknowledges that others think he "prattles with distempered spirits," but he knows that his success derives from his ability to conceive his potential: "That in conceit bear empires in our spears,/"

Affecting thoughts co-equal with the clouds" (1 Tamb., I, ii, 64-65).

His ability to use language as a tool of his imagination is twice demonstrated in his first scene, when he seduces Zenocrate and tempts Theridamas. He creates for Zenocrate a rich and sensuous vision:

A hundred Tartars shall attend on thee,
Mounted on steeds swifter than Pegasus.
Thy garments shall be made of Median silk,
Encased with precious jewels of mine own,
More rich and valurous than Zenocrate's
With milk-white harts upon an ivory sled,
Thou shalt be drawn amidst the frozen pools,
And scale the icy mountains' lofty tops,
Which with thy beauty will be soon resolved.
(1 Tamb., I, ii, 93-101)

Tamburlaine consciously manipulates the power of the creative imagination to seduce Zenocrate and he tells Techelles, "women must be flattered" (1 Tamb., I, ii, 107).

He is equally confident when he confronts Theridamas. Techelles argues that only "cowards and fainthearted runaways/Look for orations when the foe is near" (1 Tamb., I, ii, 130-31), but Tamburlaine insists he "ask a parley first" (1 Tamb., I, ii, 137). In his speech to Theridamas, Tamburlaine creates a mythic context justifying his rebellion. Tamburlaine maintains he enjoys the special protection of Jove, and offers as evidence Zenocrate and the gold he has taken as spoils:

See how he [Jove] rains down heaps of gold in
showers,
As if he meant to give my soldiers pay;
And as a sure and grounded argument
That I shall be the monarch of the East,
He sends his Soldan's daughter, rich and brave,
To be my queen and portly emperess.
(1 Tamb., I, ii, 181-87)

Tamburlaine extends the metaphor in order to demonstrate that Theridamas can also define himself in terms of the Jove myth:

Jove sometimes mask'd in shepherd's weed,
 And by those steps that he hath scaled the
 heavens,
 May we become immortal like the gods.
 Join with me now in this my mean estate . . .
 And when my name and honor shall be spread
 As far as Boreas claps his brazen wings,
 Or fair Bootes sends his cheerful light,
 Then shalt thou be competitor with me,
 And sit with Tamburlaine in all his majesty.
 (1 Tamb., I, ii, 198-201; 204-07)

Tamburlaine converts gold and Zenocrate to evidence of divine beneficence, and uses the shepherd's weeds he has just discarded to signify his resemblance to Jove. Theridamas capitulates to Tamburlaine's creative powers, and agrees to join him.

Tamburlaine is not the only character to use language as a tool for the creative power of imagination. Callapine proves himself equally capable when he tempts Almeda to release him:

The Grecian virgins shall attend on thee,
 Skillful in music as in amorous lay,
 As fair as was Pygmalion's ivory girl
 Or lovely Io metamorphos'd.
 With naked negroes shall thy coach be drawn,
 And as thou rid'st in triumph through the streets,
 The pavement underneath thy chariot wheels
 With Turkey carpets shall be covered
 And cloth of Arras hung about the walls,
 Fit objects for thy princely eye to pierce.
 (2 Tamb., I, iii, 36-44)

Callapine, like Tamburlaine, suits the terms of his vision to the character of the listener. Theridamas was susceptible to a martial strain; Almeda to a sensuous. Both accept the vision as the description of a plausible reality, and both act accordingly.

Although he cannot so use it, Mycetes is aware of the reifying function of language. He calls upon his brother Cosroe to articulate the danger to Persia "for it requires a great and thund'ring speech" of which Mycetes is incapable (1 Tamb., I, i, 1-3). When he devises a strategy against Tamburlaine, Mycetes is seduced by Meander's ability to conceive reality in terms of literary metaphor. Meander assumes that Tamburlaine's troops are "void of martial discipline." Therefore, they will be more anxious of spoils than victory. This reminds Meander of the fate that befell the soldiers who sprang from the teeth of Mars' sacred dragon: "Like to the cruel brothers of the earth,/Sprung of the teeth of dragons venemous,/Their careless swords shall lance their fellows' throats/And make us triumph in their overthrow" (1 Tamb., II, iii, 47-50). Delighted with the image conjured by Meander, Mycetes observes, "'tis a pretty toy to be a poet," and applauds Meander's plan to scatter gold on the battlefield to distract Tamburlaine's troops and so gain a victory.

In addition to its creative capacity, imagination has a transforming power. Tamburlaine defines Bajazeth as a footstool; the four Arabian suzerains as "pamper'd jades"; and his tents as a law of nature. His transforming capacity is like an irresistible force. When Tamburlaine meets the unfaithful Almeda in parley with Callapine, Callapine, in a show of bravura, invests Almeda with the crown of Ariadan. But so frightened is Almeda of his former master, he refuses to accept the crown unless Tamburlaine gives his permission: "Good my lord, let me take it." Tamburlaine grants him the crown and invests Almeda with his identity: "let him hang a bunch of keys on his

standard, to put him in remembrance he was a jailor" (2 Tamb., III, v, 138-39). Tamburlaine similarly determines Theridamas's identity. Just prior to his capitulation, Theridamas asks, "But shall I prove a traitor to my king?" Tamburlaine answers: "No, but the trusty friend of Tamburlaine." By linguistic fiat, Tamburlaine transforms Theridamas from "traitor" to "trusty friend."

Tamburlaine's perception of Bajazeth, the four Arabian suzerains, Almeda, and Theridamas determines their identities. The same is true of his three sons. When they are seated by Zenocrate, he says his sons are "more precious in mine eyes/Than all the wealthy kingdoms I subdued." But as he contemplates their hair "white as milk," "their fingers made to quaver on a lute,/Their arms to hang about a lady's neck,/Their legs to dance and caper in the air," he concludes they should be thought "bastards, not my sons" (2 Tamb., I, iv, 29-33). He qualifies his judgement by acknowledging Zenocrate's faithfulness, but insists that he cannot accept his offspring unless they are like him: "Be all a scourge and terror to the world,/Or else you are not sons of Tamburlaine" (2 Tamb., I, iv, 63-64). And when Calyphas fails to define himself in his father's terms, Tamburlaine declares him a bastard and kills him.

Tamburlaine's use of the transforming power of language to define others is not unique to him. Cosroe embraces rebellion to acquire his brother's throne, and praises Tamburlaine for cooperating in the usurpation. But when Tamburlaine rebels, he becomes for Cosroe a "devilish shepherd" possessed of "giantly presumption" (1 Tamb., II, vi, 1-2). In this instance, the change in definition is the result of action. But Baldwin's use of definition precipitates action. He tells

Sigismund that he need not keep his treaty with Orcanes. The treaty is based on holy oaths and since the Moslems have no true religion, their vows are meaningless: "for with such infidels/In whom no faith nor true religion rests,/We are not bound to those accomplishments/The holy laws of Christendom enjoin" (2 Tamb., II, i, 33-36). Similarly, Frederick defines Sigismund's reservations as simple superstition: "'tis superstition/To stand so strictly on dispensive faith." Indeed, Sigismund's willingness to uphold the treaty ignores the opportunity "God hath given to venge our Christians' death/And scourge their foul blasphemous paganism." If Sigismund fails to seize the initiative, he will not be rewarded for his integrity, but will receive from God the "jealous anger of his fearful arm" (2 Tamb., II, i, 49-57). The ability of Baldwin and Frederick to transform the terms of the treaty alters Sigismund's perception of the Moslems, and he agrees to a surprise attack. Olympia proves similarly skillful with the transforming potential of language. When Theridamas threatens her with rape, she offers him a present:

An ointment which a cunning alchemist
 Distilled from the purest balsamum
 And simplest extracts of all minerals,
 In which the essential form of marble stone,
 Tempered by science metaphysical
 And spells of magic from the mouths of spirits,
 With which if you but 'noint your tender skin,
 Nor pistol, sword, nor lance, can pierce your flesh.
 (2 Tamb., IV, iii, 59-66)

Olympia offers to let Theridamas test the ointment on her, and so seductive has been her description, he stabs her throat and kills her.

The play demonstrates the power of the creative and transforming imagination in determining action. Tamburlaine's seduction of Zenocrate

and his temptation of Theridamas; Callapine's seduction of Almeda; and Meander's influence on Mycetes derive from their ability to create a plausible vision of the future. Tamburlaine's definition of men as footstools and horses, of tents as natural laws, of Almeda as perpetual jailor, and of his sons as possible bastards; Frederick's dismissal of Sigismund's integrity as superstition; and Olympia's definition of ointment as magical demonstrate the transforming power of the mind. The ability of the mind to conjure a vision of the future, and to invest objects with value and meaning determines the decisions made by the characters in the play.

The characters do not so much confront reality as create it. Language is their creative medium, and Tamburlaine is cognizant of both the crucial role played by language in creating and defining reality and of the potential inadequacy of language. He contemplates these matters when he considers Zenocrate's influence over him:

What is beauty, saith my sufferings, then?
 If all the pens that ever poets held
 Had fed the feeling of their masters' thoughts,
 And every sweetness that inspired their hearts,
 Their minds, and muses on admiréd themes;
 If all the heavenly quintessences they still
 From their immortal flowers of poesy,
 Wherein, as in a mirror, we perceive
 The highest reaches of a human wit;
 If these had made one poem's period,
 And all combined in beauty's worthiness,
 Yet should there hover in their restless heads
 One thought, one grace, one wonder, at the least,
 Which into words no virtue can digest.

(1 Tamb., V, ii, 97-110)

Tamburlaine is attempting to decide on a course of action. He feels compelled to war against the Egyptians, but hesitates to do so because it means fighting Zenocrate's father. To make his decision, Tamburlaine

necessarily assesses Zenocrate's influence over him. He tries to identify the meaning of Zenocrate's beauty, and finds that words are inadequate to his needs. He conceives beauty as an abstraction that eludes the transforming power of the mind. It cannot be distilled into terms. There always remains "one thought, one grace, one wonder, at the least,/Which into words no virtue can digest."

Although he grows impatient with his own inability to define beauty--"But how unseemly is it for my sex. . . . To harbor thoughts effeminate and faint!"--he nonetheless feels obliged to wrestle with the problem:

Save only that in beauty's just applause,
With whose instinct the soul of man is touched,
And every warrior that is rapt with love
Of fame, of valor, and of victory,
Must needs have beauty beat on his conceits.
(1 Tamb., V, ii, 115-19)

Tamburlaine's virility makes him desirous of beauty, fame, valor and victory. As warrior, Tamburlaine feels obligated to "conquer" or possess what he desires. And it is his identity as warrior which allows him finally to resolve the difficulty presented by Beauty:

I thus conceiving and subduing both,
That which hath stopped the tempest of the gods,
Even from the fiery-spangled veil of heaven,
To feel the lovely warmth of shepherds' flames
Shall give the world to note, for all my birth,
That virtue solely is the sum of glory,
And fashions men with true nobility.
(1 Tamb., V, ii, 119-28)

Tamburlaine's reference to the shepherd echoes his earlier allusion to Jove's assuming shepherd's clothes when he wooed Mnemosyne. Tamburlaine began as a shepherd, and he asserts that he will not allow beauty to distract him from exercising his martial impulses as it did Jove. As

lover, Tamburlaine "conceives" Zenocrate as the embodiment of Beauty, and her influence can potentially affect his actions. But as warrior, he is capable of containing the influence of Zenocrate, and of suppressing the temptation to yield to her entreaties. It is this "virtue" or strength that invests Tamburlaine with the identity he most desires. It is the "sum of glory" and "fashions men with true nobility."

Tamburlaine's decision to war with Egypt thus derives from his ability to view Zenocrate from a certain perspective. If he identifies himself as lover, he must concede that her influence over him is at once compelling, uncontrollable, and undefinable. Moreover, if he yields to that influence, he will not war against Egypt. This denial of his martial ambitions will make him like Jove when he was a shepherd, and it is his identity as shepherd that Tamburlaine is particularly anxious to shed. Once he identifies himself as warrior, he gains the ability to both desire beauty and to control it. Since this ability to conceive and subdue is evidence of his virtue, it invests him with a "true nobility" as warrior. The speech on Zenocrate's beauty therefore traces Tamburlaine's conscious choice of his own identity.

The speech indicates how essential it is to Tamburlaine that he find the appropriate terms with which to name or define himself. He recognizes that as lover he loses control over his own actions. As lover, he cannot define himself as warrior because if he yields to Zenocrate, he must necessarily stop waging war. Tamburlaine dismisses this idea as effeminate, and embraces the identity as warrior because he is more anxious to identify himself in terms of virility than in the terms of a lover. Implicit in Tamburlaine's choice of identity is the

suggestion that the creative and transforming capacities of the imagination are constricted by the way identity shapes perception. Tamburlaine grows impatient with the suggestion that in Zenocrate's beauty there is something beyond his ken, something "which into words no virtue can digest." He forces the problem of beauty to conform to his conception of himself as able to discard the identity of shepherd. Once placed in this context, Tamburlaine can "subdue" the influence of beauty because he has identified it as a threat to his virility.

The consequence of Tamburlaine's constricted imagination is demonstrated at Zenocrate's death. As we have seen, Tamburlaine's identity as warrior includes the assumption that he is equal to Jove and follows his precedent. Therefore, when Zenocrate falls ill, Tamburlaine logically assumes Jove is jealous and seeks to steal Zenocrate from him. He therefore vows to seek vengeance against Jove:

Raise cavalieros higher than the clouds,
And with the cannon break the frame of heaven,
Batter the shining palace of the sun,
And shiver all the starry firmament,
For amorous Jove hath snatched my love from hence.
(2 Tamb., II, iv, 103-08)

Seduced with this vision of his own conjuring, Tamburlaine pleads with Zenocrate to return:

What god soever holds thee in his arms,
Giving thee nectar and ambrosia,
Behold me here, divine Zenocrate,
Raving impatient, desperate, and mad,
Breaking my steeléd lance, with which I burst
The rusty beams of Janus' temple doors,
Letting out death and tyrannising war,
To march with me under this bloody flag!
And, if thou pitiest Tamburlaine the Great,
Come down from heaven, and live with me again!
(2 Tamb., II, iv, 109-18)

The informing analogy by which Tamburlaine identifies himself thus leads to a fruitless denial of reality. Theridamas seeks to bring Tamburlaine back to his senses by bluntly defining the situation:

She is dead,
And all this raging cannot make her live.
If words might serve, our voice hath rent the air;
If tears, our eyes have watered all the earth;
If grief, our murdered hearts have strained
 forth blood.
Nothing prevails, for she is dead, my lord.
 (2 Tamb., II, iv, 119-24)

Theridamas reminds Tamburlaine that Zenocrate has neither been snatched by a jealous god, nor is she languishing in the arms of a new lover.

She is dead, and words cannot transform her into life. Subdued, Tamburlaine acknowledges Theridamas's blunt appraisal, but insists he be allowed to identify the event as he chooses: "For she is dead! Thy words do pierce my soul! Ah, sweet Theridamas, say so no more/Though she be dead, yet let me think she lives/And feed my mind that dies for want of her" (2 Tamb., II, iv, 125-28). Tamburlaine refuses to accept Theridamas' terms; instead he devises his own, and places Zenocrate's death in the context of his role as warrior. He identifies the place of Zenocrate's death as the cause, and it therefore becomes his enemy: "As I have conquered kingdoms with my sword/This cursed town will I consume with fire,/Because this place bereft me of my love;/The houses, burnt, will look as if they mourned" (2 Tamb., II, iv, 136-39). The burning of the town demonstrates Tamburlaine's power, and reinforces his identity as warrior:

So, burn the turrets of this cursed town,
 Flame to the highest region of the air,
 And kindle heaps of exhalations
 That, being fiery meteors, may presage
 Death and destruction to th'inhabitants!
 Over my zenith hang a blasing star,
 That may endure till heaven be dissolved,
 Fed with the fresh supply of earthly dregs,
 Threatening a death and famine to this land!
 Flying dragons, lightning, fearful thunder-claps,
 Singe these fair plains, and make them seem as black
 As is the island where the Furies mask,
 Compassed with Lethe, Styx, and Phlegethon,
 Because my dear Zenocrate is dead.

(2 Tamb., III, ii, 1-14)

The burning allows Tamburlaine to invest Zenocrate's death with a meaning consistent with his identity. He transforms the fire into a "fiery meteor" and into the fuel for his "blasing star." He then identifies these signs as portents of "death and destruction to this land!" The portents and the destruction they foretell come "Because my dear Zenocrate is dead." His identity as warrior thus creates the terms in which he mourns Zenocrate, and provides him a context for comprehending her death.

That Tamburlaine's identity as warrior necessitates his conforming reality to a very narrow set of terms is seen in his designating the place of Zenocrate's death as its cause. It is seen as well in his murder of Calyphas, for that act leads Tamburlaine to contradictory characterizations of his identity. This scene has already been examined, but it serves to demonstrate here the tensions between act and definition. Tamburlaine is angry at Calyphas because his son has failed to identify himself in terms comprehensible to his father. He is foppish rather than martial; a lover of cards rather than war. He therefore ceases to be Tamburlaine's son, and becomes instead his

enemy. Tamburlaine believes he functions as a warrior when he kills Calyphas, and in explaining his role, his two definitions of his martial motives clash. He argues that he kills Calyphas because Jove has betrayed him. Tamburlaine invested his son with the same "incorporeal spirit" that is co-extensive with Jove; but Jove failed to provide an appropriate form. Since his spirit makes him Jove's equal, Tamburlaine believes he is capable of avenging himself, and tells Jove he has "procured a greater enemy" than the Titans (2 *Tamb.*, IV, ii, 53-54). At the same time, Tamburlaine invokes the contradictory identity as scourge. Orcanes and the King of Jerusalem, who have witnessed the murder, are outraged. Tamburlaine answers their protestations by observing that Jove has not made him a scourge "for deeds of bounty or nobility" (2 *Tamb.*, IV, ii, 77). His identity is imposed upon him, and his killing of Calyphas fulfills the divine mandate to "scourge the pride of such as heaven abhors" because Jove, as a god of power, despises weakness.

In his effort to define his act, Tamburlaine contradicts himself. And the contradiction indicates the limitations of imagination. Tamburlaine attempts to create a context for explaining Calyphas' weakness, and to transform filicide into a manifestation of a divine imperative. But given the terms of his identity as warrior, his effort fails, since the context for Calyphas' death depends upon one conception of his relationship to Jove, and the justification by divine imperative depends upon another. His action cannot be adequately defined because his creative and transforming power cannot invest Calyphas' death with meaning.

The tension between definition and act in the Calyphas scene is examined more closely in the scenes of Tamburlaine's sickness and death. They give rise to the clearest instance of ambiguity in the play, and have been interpreted in mutually exclusive terms. Boas, for instance, assumes Tamburlaine dies because all men must die; Battenhouse argues that his death is an example of retributive justice for his burning the Koran.⁶³ But the illness and death scenes are designed to prevent certainty over the reasons for Tamburlaine's death. Tamburlaine falls ill after he has taken Babylon, murdered the Governor, and thrown the inhabitants into the asphaltis lake surrounding the town. He conceives of this destruction as evidence that there can be no Mahomet protecting either Babylon or himself. He therefore orders the burning of the Koran: "In vain, I see, men worship Mahomet,/My sword hath sent millions of Turks to hell,/Slew all his priests, his kinsmen, and his friends,/And yet I live untouched by Mahomet" (2 Tamb., V, i, 177-80). He uses the burning as a test of the prophet whom he had "thought a god," and establishes a conditional covenant with him. If Mahomet avenges the burning, then Tamburlaine will believe in his power: "now Mahomet, if thou have any power,/come down thyself and work a miracle" (2 Tamb., V, i, 185-86). Almost immediately, Tamburlaine falls ill, but he does not identify the illness in terms of the covenant with Mahomet.

The scene following has Callapine petitioning Mahomet to help him avenge Tamburlaine's destructiveness:

Ah, sacred Mahomet, thou that hast seen
 Millions of Turks perish by Tamburlaine,
 Kingdoms laid waste, brave cities sacked and
 burnt,
 And but one host is left to honor thee,
 Aid thy obedient servant Callapine,
 And make him after all these overthrows,
 To triumph over cursed Tamburlaine.
 (2 Tamb., V, ii, 24-30)

In terms of dramatic structure, the proximity of this petition to the Koran scene suggests that the battle with Callapine will demonstrate conclusively Mahomet's efficacy, since Callapine assumes he functions as an instrument of retribution. But while Callapine's attack contributes to Tamburlaine's death, Tamburlaine defines the attack not as a sign of divine retribution, but of divine protection. Callapine's action gives Tamburlaine an assurance he lacks when he first falls ill. He conceives of his illness as a sign that the gods are jealous of sharing equal powers with him. He vows to "set black streamers in the firmament/
 To signify the slaughter of the gods,/That thus envy the health of
 Tamburlaine" (2 Tamb., V, iii, 49-52). The doctor tells Tamburlaine "this day is critical" and if Tamburlaine will avoid the activity that has inflamed and parched his "artiers," he may recover. Tamburlaine vows to "comfort all my vital parts,/And live, in spite of death, above
 a day" (2 Tamb., V, iii, 91-101). But his essential identity as warrior prevents inactivity. Callapine attacks, and Tamburlaine must act. Showing his face to the oncoming army, they scatter and Tamburlaine identifies his victory as evidence of Jove's paternal protection: "In vain I strive and rail against those powers/That mean t'invest me in a
 higher throne" (2 Tamb., V, iii, 120-21). While he first conceived his illness as a sign of divine jealousy, he here assumes it is a sign of

beneficent providence.

Tamburlaine's confidence that even his death will evidence Jove's paternalism illustrates the relationship between the imaginative powers and perception. Understood in the light of the doctor's diagnosis, Tamburlaine's engagement with Callapine seems a form of suicide. But Tamburlaine identifies it as divine medicine. His conception of himself as warrior leads to his defining a causal relationship first between illness and a war with the gods, and subsequently, between illness, victory, and divine protection. His defeat of Callapine confirms his identity as warrior, and allows Tamburlaine to once again consider himself as an instrument of the divine. No other interpretation is available to him. He does not perceive his death as a kind of suicide, or as resulting from old age, or as the fulfillment of his conditional covenant with Mahomet. His identity as warrior determines the context in which he understands his death, and the transforming powers of his imagination invest his death with meaning.

The terms in which Tamburlaine defines his death render the scenes ambiguous precisely because it is impossible for him to define his death as an act of retributive justice. The juxtaposition of the burning of the Koran, Tamburlaine's illness, and Callapine's prayer and subsequent attack, which contributes to Tamburlaine's death, suggest a causal relationship between blasphemy, divine wrath, and death. But nothing in Tamburlaine's perception of the event supports this causal construction. Causality is determined not by the sequence of events, but by the power of the imagination to invest events with meaning. That there is no necessary correlation between an act and how it is

understood is demonstrated by Tamburlaine's contradictory interpretations of his illness, and by the various other possible explanations of his death. Any one of these explanations are plausible. But the meaning of the death is not exterior to Tamburlaine's imagination. It is only because he can conceive a causal relationship between illness and death that they have any meaning at all.

The emphasis in the play on the relationship between perception and act therefore culminates in the death scene. The scene demonstrates that reality consists not of what is known, but of how it is known. The ability of the mind to create mythic contexts for action, and to transform object into symbol allows the characters to define causal relationships in terms of their own identity. Sometimes events seem to test the validity of perception. The histories of Mycetes, Cosroe, and Bajazeth demonstrate the inadequacy of their perception to the appreciation of reality. Tamburlaine's struggle with the meaning of beauty, his inability to face squarely the fact of Zenocrate's death, his justification of filicide in mutually exclusive terms, and his contradictory assumptions about the meaning of his illness demonstrate the limitations imposed by his narrow identification of himself as warrior. But his ability to conceive the terms by which he defines these events indicates as well the crucial function of the imagination to defining reality. If he lacked the identity as warrior and the imagination to perceive events in terms of that identity, his actions--including his death--would be bereft of meaning.

Tamburlaine's use of his imaginative powers to invest actions with meaning derive from his metaphysical conceptions. His identity as

warrior is premised on the assumption that he either participates in divinity, or enjoys special protection by the gods. His confidence that he correctly perceives reality therefore derives from his assurance that he can correctly identify divinity. This attitude is epitomized in the Koran scene. In addition to engaging in a conditional covenant with Mahomet, Tamburlaine articulates his conception of God: "There is a God, full of revenging wrath,/From whom the thunder and the lightning breaks,/Whose scourge I am, and Him will I obey" (2 Tamb., V, i, 181-83). This is the conception of God that informs Tamburlaine's actions throughout the play, the god of pure power. But Tamburlaine offers a second description of God, and it is more problematic. As he burns the Koran, he tells his followers:

Well, soldiers, Mahomet remains in hell;
He cannot hear the voice of Tamburlaine.
Seek out another godhead to adore--
The God that sits in heaven, if any god,
For he is God alone, and none but He.
(2 Tamb., V, ii, 196-200)

The conditional "if any god" renders the sentence difficult. In the context of the entire sentence, it could mean that the soldiers, if they seek any god, should seek the one God who sits on high. But considering the position of the phrase, the sentence could also mean that the soldiers should worship only one God since he is the only God there is, provided there is a God at all. Either way, the skepticism of the passage is unique to Tamburlaine, since he does not otherwise suggest the possibility of disbelief, but it is not unique to the play.

Throughout Tamburlaine, divinity is addressed through presumptive covenants and through petition. Tamburlaine's presumptive covenant--

that he enjoys the special protection of Jove--is the most memorable, since events seem to prove his presumption correct. Other presumptive covenants are not so completely fulfilled, however. Bajazeth, for instance, swears "by Mahomet my kinsman's sepulcher,/And by the holy Alcoran" (1 Tamb., III, iii, 74-75) that he will make Tamburlaine an eunuch; the Soldan makes "a sacred vow to heaven . . ./Confirming it with Ibis' holy name/That Tamburlaine shall rue the day . . ." (1 Tamb., IV, iii, 36-37); and Sigismund swears by "Sweet Jesus Christ" to "keep this peace inviolable" (2 Tamb., I, ii, 58-59). None of these presumptive covenants are realized. The same is true of petition: Cosroe prays that his stars "direct his weapon" (1 Tamb., II, vii, 38) against Tamburlaine, and he is immediately killed in battle; Zabina prays, "Mahomet, solicit God himself,/And make him rain down murdering shot from heaven," (1 Tamb., III, iii, 195-96) and almost immediately hears of Bajazeth's defeat; and the Second Damascene Virgin prays to "the majesty of heaven" (1 Tamb., V, i, 48) for mercy from Tamburlaine, but receives none.

The unanswered covenants and prayers suggest that the characters have failed to properly conceive the nature of God. And the Sigismund-Orcanes episode indicates that this failure is an inevitable consequence of perception. Sigismund yields to Baldwin and Frederick when they redefine the Moslems as atheists and designate God as vengeful. When Orcanes learns of Sigismund's betrayal, he, like Tamburlaine, makes a conditional covenant:

Thou Christ that art esteemed omnipotent,
 If thou wilt prove thyself a perfect God,
 Worthy the worship of all faithful hearts,
 Be now revenged upon this traitor's son,
 And make the power I have left behind--
 To little to defend our guiltless lives--
 Sufficient to discomfort and confound
 The trustless force of those false Christians.
 To arms, my lords! On Christ still let us cry.
 If there be Christ, we shall have victory.
 (2 Tamb., II, ii, 55-64)

As was the case with Tamburlaine's illness, Orcanes's victory suggests that the terms of the covenant have been fulfilled. Sigismund dies convinced he has felt the vengeful wrath of God, but Orcanes himself is not quite sure how to interpret the victory: "Christ or Mahomet hath been my friend" (2 Tamb., II, iii, 11). He asks Gazellus if he thinks Christ favored their cause. Gazellus gives a skeptical answer: "'Tis but the fortune of the wars, my lord,/Whose power is often proved a miracle" (2 Tamb., II, iii, 30-31). The victory over Sigismund thus can be understood as either a sign of God's vengeance, Mahomet's protection of the Moslems, or nothing more than the fortunes of war.

The question essential to the Sigismund-Orcanes episode, as well as to those episodes which include petition and presumptive covenants, is whether or not divinity functions as an intercessory agent. The answer supplied by the play is that it is not possible to know. When events conform to expectation, as they often do for Tamburlaine, and as they do for Orcanes, then it seems God has interceded; but the difficulty Tamburlaine and Orcanes encounter when they attempt to define consistently the correlative between action and divinity indicates that God appears to intercede because the imagination places the necessary causal construction on events. The nature of divinity

remains unknowable; God is named only as a result of the interaction between identity, action, perception, and imagination, and the accuracy of the name cannot be decisively tested.

Since identity determines the construction placed on perception by imagination, the definition of God necessarily depends upon the identity of whomever attempts the definition. In other words, metaphysics is determined by human needs, rather than human needs deriving from a metaphysical source. Tamburlaine is compelled to conquest; therefore, he defines himself as one whose "incorporeal spirit" participates in divine infinity with which he is co-extensive. In addition, Tamburlaine is eager for a place in history; therefore, he identifies himself in terms of a providence which uses him as the instrument for realizing a divine plan. Whether or not there is a validity underlying his conceptions is impossible of resolution. Even when events seem to indicate Tamburlaine is wrong--as when he falls ill after burning the Koran--he is able to construe them to fit his preconceptions. Since his needs yield contradictory conceptions of God, the ambiguity in the play arises from the terms of Tamburlaine's own identity. The play is concerned not with the morality of its hero, but with the correlation between identity, action, and imagination.

Considering how much the play seems to draw upon the Neo-Platonist premises of Elizabethan science, it is reasonable to assume that Marlowe's depiction of the function of imagination is influenced by this source as well. In arguing for the importance of mathematics, both Digges and Dee urged their readers not to rely on sensual perception as an accurate measure of reality.⁶⁴ Behind the flux of perceived reality

there is a harmony, and number is its measure. The assumption that perception is limited and distorting is certainly a feature of Marlowe's treatment of ambiguity in Tamburlaine. The ideas associated with Neo-Platonism also argued for a negative theology. Since God is immanent, he is everywhere, and cannot be positively named. This argument is offered, for instance, in Asclepius:

For I deem it impossible that he who is the maker of the universe in all his greatness, the Father or Master of all things, can be named by a single name, though it be made up of ever so many others; I hold that he is nameless, or rather, that all names are names of him. For he in his unity is all things; so that we must either call all things by his name, or call him by the names of all things.

(Asclepius, p. 333)

Cusa quotes this passage and approves its sentiment (Cusa, p. 53). But Ficino argues that God can be rightly named, and the name allows man to pull God closer to him:

Notice that the power of a natural object reaches through the senses to the imagination, through the imagination to the intelligence by which it is apprehended and enclosed in a name, just as life and understanding are enclosed in the body. But notice that the divine power reaches through the heavenly intelligences to our intelligence by which it is apprehended and similarly named with a living name. And this name is more alive than the names of bodily objects to the extent that the movement coming down to us from those above is more powerful--coming down to us, I say, when we become more like God, that is, when we recall our intelligence from lower things.

(Ficino, Philebus, p. 142)

Both of these attitudes towards naming God are pertinent to Tamburlaine. The Asclepius and Cusa emphasize the essential limitation of language. It is inadequate to naming the ineffable. Ficino assumes that language is generated by the intelligence as a means of naming what imagination

perceives, and that language can literally invoke God because it correctly names Him. But neither of these assumptions grants to imagination the ability to create and transform the conception of God, and that is the power assigned to imagination in Tamburlaine. While the play does demonstrate the inadequacy of language to define abstraction, and examines the correlation between the perception of divinity and how God is defined, it suggests as well that the identity of the perceiver determines how he shapes and transforms his metaphysical conceptions in order to justify his actions.

This attitude is essentially skeptical, and derives not from the premises upon which Elizabethan science operated, but upon the conclusions it generated. The science of the period fostered two contradictory assumptions about the human condition from the same set of ideas. Pythagorean-Platonism, mathematics, and observation were employed to buttress the assumption that man could predicate his behavior on a knowledge of physical law. But that knowledge led to two different conclusions about the human condition. The scientist who joined hands with the promoters of English expansion argued that a knowledge of natural law would contribute to a happier, self-determined future; the astrologer argued that it allowed man to predict when God would end the world. The first promoted a belief in the efficacy of the individual; the second, a belief that man was simply an instrument of divinity. The treatment of perception in Tamburlaine suggests that such a dichotomy, since it is generated by similar premises, derives from the impact of the imagination on perception.

The Elizabethan age was particularly susceptible to skepticism. It is customary to recount the tremendous amount of new information that culture absorbed. Elizabethans learned of new worlds, and new customs as well as of new interpretations of older knowledge. They observed as well the juxtaposition of two new cosmographies, both of which adequately explained observed phenomena. But what is occasionally overlooked is how cognizant they were of the difficulties posed by the conflicting ideas they confronted. Shortly after Tamburlaine was produced, for instance, Blagrove designed an astrolabe which, depending on the way it was held, could be used to calculate astronomical movements on the basis of a heliocentric or geocentric cosmography. Similarly, Francis Shakelton (A Blazing Starre or Burning Beacon, 1580) is delighted with Digges's observations on the supernova because they supported his argument that extra-terrestrial disruption signalled the end of the world. But he refuses to accept the heliocentric theory Digges tested by his observation. Shakelton asserts uncategorically that the earth is the center of the world.⁶⁶ Both Blagrove and Shakelton demonstrate a conscious selectivity. Shakelton was aware of an alternative system which explained the supernova in different terms than his, but he rejects the alternative while accepting the data. Blagrove knew of both systems, and willingly embraced both, since both adequately explained the phenomena he was interested in measuring.

A sophistication similar to Blagrove's is evident in Marlowe's Tamburlaine. Marlowe paints a portrait of the expansionist spirit, and draws upon the sector of his culture that contributed substantially to fostering it. The interest in world conquest through naval superiority

and the quasi-religious rhetoric used to promote ambition are elements in his portrait, and derive from the scientific manuals. And science provides as well the intellectual context for the play. Science was interested in the physical implications of the Neo-Platonist concept of an infinite divine will, and Tamburlaine's vocabulary of form and matter, as well as his anti-hierarchical assumptions reflect this scientific activity. The new interest in Neo-Platonist mathematics manifested itself as well in the doomsday pamphlets, and Tamburlaine's role as scourge is based on the assumption that Providence guides history. Neither set of conclusions was exclusively scientific. Both reflected the impact of theology, and therefore, the activities in the scientific community had profound implications for metaphysics. Since the conclusions fostered by science emphasized two different aspects of divinity--Will and Providence--and gave rise to two different pictures of the human condition--expansive and constrained--their conclusions led to contradictory metaphysical assumptions. Marlowe does not engage in special pleading for one or the other of these conceptions. Like Blagrove, he embraces them, and his play is an instrument designed to elucidate both. Tamburlaine is a portrait of the age, and defines as its central issue the relation between what is perceived and how it is perceived.

Notes

- ¹Godshalk, Marlovian World Picture, p. 7.
- ²Harry Levin, "Marlowe Today," TDR, 8 (1964), p. 30.
- ³M. M. Mahood, Poetry and Humanism (New Haven: Yale University Press, 1950), p. 64.
- ⁴Una Ellis-Fermor, Christopher Marlowe (1927; rpt. Hamden, Conn.: Archon Books, 1967), p. 39.
- ⁵Roy W. Battenhouse, Marlowe's 'Tamburlaine' (Nashville, Tenn.: Vanderbilt University Press, 1941), pp. 15-16.
- ⁶For a discussion of current Marlowe criticism see Levin, "Marlowe Today," pp. 22-31; Irving Ribner, "Marlowe and the Critics," TDR, 8 (1964), pp. 211-25; Godshalk, p. 7; see below, pp. 119-20.
- ⁷Havelock Ellis, ed., Christopher Marlowe (London: Fisher Unwin, Ltd.), p. xxxiv.
- ⁸J. B. Steane, Marlowe: A Critical Study (Cambridge: Cambridge University Press, 1944), p. 74.
- ⁹Michel Poirier, Christopher Marlowe (London: Chatto & Windus, 1951), p. 102.
- ¹⁰Douglas Cole, Suffering and Evil in the Plays of Christopher Marlowe (Princeton: Princeton University Press, 1962), p. 256.
- ¹¹Charles G. Masinton, Christopher Marlowe's Tragic Vision (Athens, Ohio: Ohio University Press, 1972), p. 26.
- ¹²Eleanor Grace Clark, Raleigh and Marlowe (New York: Fordham University Press, 1941), pp. 312-14.
- ¹³Sir George Peckham, A True Reporte (London, 1583). Reprinted in The Voyages and Colonising Enterprises of Sir Humphrey Gilbert, ed., David Beers Quinn. Hakluyt Society (1940; rpt. Nadeln/Liechtenstein: Kraus Reprint Limited, 1967). All subsequent citations are to this edition.
- ¹⁴For the continuity of the alliterative technique in English prose see R. W. Chambers, On the Continuity of English Prose from Alfred to More and his School (London: Oxford University Press, for E.E.T.S., 1957), pp. ci-cx; cxxxi-cxxxiv; cliv ff.; for a discussion

of the metrical homily, see G. R. Owst, Preaching in Medieval England (Cambridge: Cambridge University Press, 1926), pp. 273 ff.

¹⁵See above, pp. 49-50; 55-56.

¹⁶A copie of the Speache: Made by the Mathematicall Lecturer, unto the Worshipfull Companie Present, At the House of the Worshipfull M. Thomas Smith dwelling in Gracious Street: The Fourth of November, 1588.

¹⁷See above, p. 79, and note.

¹⁸See Dee, "Preface," sigs. *iii-*iiii^v; Bakeless, Tragicall History, I, p. 212; Tillyard, Elizabethan World-Picture, p. 62; Carroll Camden, Jr., "Tamburlaine: The Cholerick Man," MLN, 44 (November, 1929), pp. 430-35.

¹⁹See above, p. 67.

²⁰This is the premise offered by Clark, Raleigh and Marlowe; and Bradbrook, School of Night.

²¹Anthony Esler, The aspiring mind of the Elizabethan younger generation (Durham, N.C.: Duke University Press, 1966), p. 78.

²²Esler, pp. 89-90.

²³Scott, Joint Stock Companies, I, p. 69; Scott uses later documents to suggest that in Elizabeth's time the Turkish government was regarded as unique in its "'perfectly despotic nature,'" II, p. 86.

²⁴See, for instance, John Bysshopp, Beautiful Blossomes (London, 1577), pp. 143-43^v; George Whetstone, The English Myrroure (London, 1586), pp. 55-60.

²⁵Louis LeRoy, Of the Interchangeable Course, or Variety of Things in the Whole World, trans., Robert Ashley (1575; trans. London, 1594), pp. 107-09; see Hallett Smith, "Tamburlaine and the Renaissance," in English Studies and Other Essays in Honor of George T. Reynolds (Boulder, Co.: University of Colorado Studies, 1945), pp. 126-31.

²⁶Thomas Fortescue, The Foreste (London, 1571). Pertinent chapters reprinted in Una M. Ellis-Fermor, ed., Tamburlaine the Great in Two Parts (London: Methuen & Co., 1950), pp. 126-31.

²⁷Jean Bodin, The Six Bookes of a Commonweale, trans. Richard Knolles. Ed., Kenneth Douglas McRae (Cambridge: Harvard University Press, 1962), pp. 220-221. The Six Bookes was published in French in 1576; Latin, 1586; English, 1606. See also Hugh Dick, "Tamburlaine Sources Once More," SP, 46 (1949), 154-66.

²⁸LeRoy, p. 107^v.

²⁹Edward Grant, "Medieval and Seventeenth Century Conceptions of an Infinite Void Space beyond the Cosmos," ISIS, 60 (1969), p. 50; A. O. Lovejoy includes in his The Great Chain of Being (Cambridge: Harvard University Press, 1950), a discussion of infinity as part of his general interest in the idea of plenitude. Lovejoy emphasizes the extent to which the concept of infinity reinforced the traditional ideas of the inferiority of the earth and human nature: "If man's position in the universe was no longer peculiarly degraded, his littleness, at all events, was more apparent than ever" (p. 122). This study offers a different set of conclusions than Lovejoy regarding the impact of the idea of infinity.

³⁰Grant, p. 46. The translation is by Grant.

³¹Grant, p. 47. The translation is by Grant.

³²Grant, p. 46. The translation is by Grant.

³³Grant, p. 48. The translation is by Grant.

³⁴See Dr. D. J. B. Hawkins in introductory essay to Of Learned Ignorance by Nicholas Cusa, trans. Germain Heron (New Haven: Yale University Press, 1954), p. x. Subsequent citations of Cusa are to this text; see also, Ernst Cassirer's remark: "Cusanus . . . was perhaps the first Western thinker to attain an independent insight into the fundamental and essential sources of Platonic doctrine," in The Individual and the Cosmos in Renaissance Philosophy, trans. Mario Domandi (1963; rpt. Philadelphia: University of Pennsylvania Press, 1972), p. 15.

³⁵Hawkins, in Of Learned Ignorance, p. xi; see also Barnabe Googe, trans., The Zodiacke of Life by Marcellus Palingenius, reprinted with introduction by Rosemond Tuve (New York: Scholars' Facsimiles and Reprints, 1947), p. xix; Johnson, Astronomical Thought, pp. 145-49; 162-63; and Alexander Koyre, From the Closed World to the Infinite Universe (Baltimore: Johns Hopkins Press, 1957), pp. 24-25.

³⁶See Johnson and Larkey, "Thomas Digges," p. 101; and above, pp. 46-47.

³⁷See Koyre, p. 36; pp. 28-29.

³⁸Lewis Mumford, The Pentagon of Power (New York: Harcourt, Brace, Jovanovich, Inc., 1970), pp. 28ff; Yates, Giordano Bruno, pp. 69ff, 82, 137, 151ff; Burt, Metaphysical Foundations, pp. 47-49.

³⁹Yates, pp. 153-54; Burt, p. 45; Mumford, p. 32; Koyre, pp. 28-29; Herbert Butterfield, The Origins of Modern Science, 1300-1800 (1957; rev. ed. New York: Free Press, 1965), p. 38.

⁴⁰Quoted Burt, p. 45.

⁴¹The reader will recall that the full title of Digge's treatise is "A Perfit Description of the Caelestiall Orbes, According to the most auncient doctrine of the Pythagoreans." See above, p. 46.

⁴²Yates, p. 247.

⁴³Giordano Bruno, On the Infinite Universe and Worlds, trans. Dorothea Waley Singer, in Giordano Bruno His Life and Thought (New York: Henry Shuman, 1950), p. 112.

⁴⁴Giordano Bruno, Concerning the Cause, Principle, and One, trans. Sidney Greenberg in The Infinite in Giordano Bruno (New York: Columbia University Press, 1950), p. 112.

⁴⁵Yates, p. 247.

⁴⁶Grant, p. 47.

⁴⁷Cusa, p. 111.

⁴⁸See Yates, p. 224, f.n.

⁴⁹Walter Scott, trans. Asclepius III in Hermes Trismigistus, Hermetica, I (Oxford: Clarendon Press, 1924-26), p. 319. All subsequent citations of Asclepius are from this edition.

⁵⁰Asclepius III, p. 317, 319; Asclepius I, p. 291.

⁵¹Paschal Beverly Randolph, ed., Hermes Mercurius Trismegistus: His Divine Pymander, trans. Dr. Everard, 1606 (1889; rpt. Mokelumne Hill, Calif.: Health Research, 1972), p. 97-98. All subsequent citations from the Pymander are from this edition.

⁵²Michael J. B. Allen, Marsilio Ficino: The 'Philebus' Commentary (Los Angeles: University of California Press, for the Center for Medieval and Renaissance Studies, 1975), p. 246. All subsequent citations of the Philebus are from this edition.

⁵³Pico della Mirandola, "Oration on the Dignity of Man," trans. Arturo B. Fallico and Herman Shapiro in The Italian Philosophers (New York: Modern Library, 1967), p. 143. All subsequent citations of the "Oration" are from this edition.

⁵⁴Several of the suggested sources for Tamburlaine omit any reference to his role as Scourge; see, for instance, the histories of Tamburlaine in Bodin, Six Bookes, sig. viii; Bysshe, Beautiful Blossomes, pp. 146V-148V; Whetstone, Englysh Mirrour, pp. 71-72; and Primaudaye, The French Academie, trans., J[ohn] B[aine] (London, 1586), p. 475. LeRoy definitely associates Tamburlaine's role as Scourge with

his defeat of Bajazeth and the relief brought to the Christians as a result (Of the Interchangeable Course, p. 108^v). Bavande also links Bajazeth with Tamburlaine's role as Scourge (A woorke of Ioannes Ferrarius Montanus, sig. 178^v). Fortescue's account differs from LeRoy and Bavande. Tamburlaine identifies himself as Scourge when he is criticized by a merchant subsequent to Tamburlaine's cruel treatment of the virgins from a city he has besieged (The Foreste, p. 70).

⁵⁵Quoted Chamber, Continuity of English Prose, p. clii.

⁵⁶See Bavande, A woorke of Ioannes Ferrarius Montanus, p. 178^v; Paulus Giovius, Elogia Virorum bellica virtute illustrium (Basle, 1575), discussed in Battenhouse, Tamburlaine, pp. 129ff.

⁵⁷Tuveson, Millenium, pp. 28ff.

⁵⁸Similar wording is found in other doomsday pamphlets. See above, pp. 95ff and LeRoy, p. 2.

⁵⁹Mary E. Rickey, "Astronomical Imagery in Tamburlaine," in Renaissance Papers, ed. Alan H. Gilbert (Columbia, S.C.: University of South Carolina, 1954), pp. 63-70; Sanford Sternlicht, "Tamburlaine and Iterative Sun-Imagery," English Record, 16 (April, 1966), pp. 23-29.

⁶⁰See Kocher, Christopher Marlowe, p. 224 and f.n.

⁶¹As we have noticed, Bruno's conception of space is also non-hierarchical. See above, p. 155; and also LeRoy, p. 1^v.

⁶²Marsilio Ficino, "Concerning the Sun," trans., Arturo B. Fallico and Herman Shapiro, The Italian Philosophers (New York: Modern Library, 1967), pp. 118-141. All subsequent citations are to this edition.

⁶³F. S. Boas, Christopher Marlowe: A Biographical and Critical Study (1940; Oxford: Clarendon Press, 1953), p. 100; Battenhouse, Christopher Marlowe, p. 177.

⁶⁴See above, pp. 47 and 58.

⁶⁵John Blagrove, Astrolabium Uranicum Generale (London, 1496); see Taylor, Math. Pract., p. 334.

⁶⁶See above, p. 93.

CHAPTER 4

This study began by expressing a concern over the constraints placed upon literary interpretation by an appreciation of Elizabethan culture as essentially monolithic, and concludes with an assessment of the ambiguity of Marlowe's Tamburlaine. While this dramatic polarity has often been ignored or characterized as an example of Marlowe's ambivalence, an awareness of Marlowe's intellectual and social contexts indicates that it arises out of certain tensions inherent to his period. A study of the attitudes fostered by science allows for an understanding of Marlowe's work without necessitating the intellectual hedges that he was either a failed Romantic or a Richard Hooker who could write drama. If Marlowe emerges as less heterodox than some have assumed, and as less orthodox than have others, his work has gained an integrity it otherwise lacked.

While this study has paid little attention to the biographical documents linking Marlowe to Hariot, and by inference, to Raleigh and the supposed School of Night, it is to be hoped that it has suggested a wider context for assessing both the activities of the School and the possible influence on Marlowe. As we have noticed, Muriel Bradbrook necessarily argues that the School of Night was a secretive and exclusive club intoxicated with heterodox and novel ideas. But her evaluation is weakened if her assumptions about the nature of the age are examined. She characterizes the School in these terms:

The esotericism of the school was partly due to necessity. The public attitude towards free intellectual enquiry has been already mentioned: there was actual danger in too aspiring a mind. Secondly, much of Hariot's astronomy must have appeared incomprehensible to the generality, with a result quite opposite to that which the modern astronomer may look for. Thirdly, there does seem to have been a strong tinge of the occult in the school. Fourthly, some of the members were of a haughty and self-sufficient spirit, and not averse from accepting the popular verdict that they were not as other men.

(Bradbrook, p. 53)

Bradbrook assumes the School was esoteric because there is so little documentary evidence of the existence of such a group as she characterizes it (Bradbrook, p. 53). This in itself is a curious argument, since Bradbrook suggests not a weakness in her historical research, but a conscious diversionary tactic on the part of those who are the subject of inquiry. Her second assumption tacitly suggests a uniformity of opinion among all Elizabethans. Bradbrook's use of the phrase "the public" is, as Steane would say, "deftly inclusive" (Steane, p. 74). While Elizabethan suspicions about Raleigh's religious beliefs are well documented, Bradbrook suggests throughout that much of the "free inquiry" practiced by the School had to do with scientific matters and an interest in Hermeticism. In these two areas, at least, the group reflected the interests of a growing proportion of Elizabethans. The same is true of occultism, as the proliferation of astrological tracts indicates. Bradbrook hints that Hariot would have been the object of particular suspicion by reason of his interest in astronomy. This conclusion seems especially unsound. When Hariot was in Raleigh's employ, he was concerned specifically with training captains in the navigational sciences. Far from arousing suspicion, his work was probably the object

of great interest to courtiers and merchants interested in overseas expansion. The secrecy associated with Harriot's role as tutor probably arose not from his fear of the public, but either from Raleigh's desire to keep information about mathematical navigation away from his competitors in the business of privateering, colonization, and exploration or from the fact that Harriot's solutions for navigational problems employed a mathematics too advanced for the average ship's master or captain.¹ And Bradbrook's final conclusion--that the School was intentionally reclusive because the members disliked public display --is at best an off-handed assessment. The characterization certainly does not suit Raleigh or his half-brother Humphrey Gilbert.

Bradbrook's assessment of the School of Night and Marlowe's possible association with it is not a useful tool for interpreting Marlowe's artistic intent because Bradbrook's historical predilections lead her to embed the School in an ambience of secrecy and heterodoxy. A sounder approach to the School of Night is taken by Robert Lacey in his recent biography of Raleigh. He is careful to distinguish between the attitudes of certain portions of Elizabethan society, and the views of the group itself. He calls Raleigh and his associates the Durham Set, referring to Raleigh's use of Durham House as headquarters for a variety of personal and governmental activities, and notes that Raleigh attracted to it the most distinguished members of the realm (Lacey, p. 110). While Lacey is willing to concede that the spirit of free enquiry which dominated Durham might have aroused suspicions among some of Raleigh's contemporaries, he is careful to note that the assignation of the group as heterodox derives primarily from Robert Parson's

condemnation of Raleigh's "'school of atheism . . . and of the conjurer that is M[aster] thereof'"--the conjuror is, of course, Hariot (Lacey, p. 112). Noting that Parson's attack is part of a vitriolic Jesuit propaganda tract that also condemns the pious Lord Burghley, Lacey views with not a little skepticism those who have inflated Parson's remarks to proof of the heterodox leanings of the Durham Set:

in the case of Sir Walter Raleigh, the charge of atheism stuck. Tales of his scientific experiments in Durham House with Thomas Hariot and the "Wizard Earl" were to travel to Scotland and poison the mind of the future James I against him before ever that king came south to take over Elizabeth's throne, and, in the twentieth century, some scholars have established a little industry producing treatises that speculate on Sir Walter Raleigh's "School of Night" and the references that William Shakespeare might, or might not, have made to it in his play Love's Labour's Lost.

(Lacey, p. 113)

Lacey suggests that the Durham Set was a particularly bright group of statesmen, courtiers, scholars, scientists, and intelligensia who were curious about the advances in science, but that they did not regard themselves as either secretive or heterodox. Rather, the suspicions surrounding Raleigh and his associates derive ultimately from political sources. As the circle of political intrigue closes around Raleigh, and as Hariot moves closer to the frontiers of speculative science--in his later studies of atomism, for instance--there is evidence of caution on Raleigh's part and a desire for secrecy on Hariot's.² But these were later developments and cannot be taken into consideration when evaluating Marlowe's relationship with either man, since he was dead by the time these attitudes obtained.

The problems associated with definitely connecting Marlowe and the Raleigh Circle make the issue impossible of resolution, particularly if an effort is made to connect the ideas in Tamburlaine with Marlowe's association with either Hariot or Raleigh. The one sure link between Hariot and Marlowe comes from Kyd's testimony. It is suspect since Kyd's confession was obtained after torture. But even if it is assumed that Kyd told the truth, the problems of dating prevent certainty in the matter. It is impossible to date exactly Marlowe's composition of Tamburlaine, and it is equally difficult to trace Hariot's movements. He was in America from 1585 to 1586 and between 1587 and 1589 he may have been attending to Raleigh's estates in Ireland.³ It is doubtful that Hariot and Marlowe could have met prior to 1585, since Marlowe was still at Cambridge, and it is difficult to establish a time when they could have met after Hariot's return from Virginia. It may be that Hariot remained in London and came to know Marlowe, but there is no way to know. Similarly, there is no way to know for sure that Marlowe was composing Tamburlaine at the time. Marlowe may have made the acquaintance of Hariot at a later date, since Marlowe moved in aristocratic circles, but again, there is no way to identify their association with certainty.

The entire question of Marlowe's association with the Raleigh Circle is a moot issue at any rate until the characteristics of the Circle are placed more definitely in the context of the Elizabethan period. Before we can assess the influence of the Circle, it is necessary to know more precisely what were its activities and the extent to which the interests of the Raleigh Circle were similar or dissimilar to the interests of that portion of Elizabethan society interested in

the new science and English expansionist schemes. It is safe to say that the references in Tamburlaine to naval dominance, imperialism, cartography, as well as the technical vocabulary, indicate that Marlowe wrote about activities and ideas of particular interest to Raleigh. But they were of interest to a number of other Elizabethans as well. Considering the current state of historical scholarship, it is perhaps reasonable to argue that in Tamburlaine there are certain features that offer sufficient evidence to indicate Marlowe's association with the Circle, but not the necessary evidence.

The problem of the School of Night indicates the importance of a revaluation of the Elizabethan period based upon a careful assessment of historical documents, attention to dating, and an awareness of the differences between particular social groups and the ideas and cultural attitudes to which they were drawn. By approaching the period in terms other than those offered by the Tillyardian school it is possible to widen the contexts in which the period is understood. Wilbur Sanders has complained: "Our conception of the Elizabethans had been codified for us into an 'orthodoxy,' a world-picture which, if it has not yet induced complete apathy about these dull, conformist people, has only failed to do so because generation after generation of readers and playgoers has known that the literature itself offers much more."⁴ The concern of this study has been to suggest the sort of detailed approach to the period that allows for a greater coincidence between response and critical interpretation. As the remarks here of Sanders, and the earlier comments by Howarth and Elton indicate, there is a growing dissatisfaction with the dominant influence of the monolithic view of

the Elizabethan age. It is an historical misconception which can be corrected only by more careful attention to contemporary publications, a concern for differences in social classes and interests, a care for the richness of the Renaissance intellectual heritage, and a sensitivity to the variety of interests and influences characteristic of any age.

Notes

¹See Taylor, Math. Prac., p. 45; Waters, The Art of Navigation, p. 591.

²See for instance, Harriot's letter to Kepler dated (o.s.) 13 July, 1608 in which Harriot closes his discussion of atomism with the observation: "our situation is such that I still may not philosophize freely; we are still stuck in the mud" (C. Frisch, ed., J. Keppleri . . . opera omnia, II, Stuttgart, 1857, p. 74). Harriot's patron, Henry Percy, earl of Northumberland, had been imprisoned in connection with the Guy Fawkes conspiracy in 1606 and remained in the tower until 1621. Harriot himself was imprisoned in connection with the conspiracy in 1605. Raleigh had been imprisoned in 1603 and would remain in the tower for twelve years. These circumstances undoubtedly form the context for Harriot's caution. Notice that his secrecy results from a political situation that developed well after Marlowe's death in 1593.

For further details of Harriot's biography, see John W. Shirley, "Sir Walter Raleigh and Thomas Harriot," in Thomas Harriot: Renaissance Scientist, ed. John W. Shirley (Oxford: Clarendon Press, 1974), pp. 16-35; Robert H. Kargon, Atomism in England from Harriot to Newton (Oxford: Clarendon Press, 1966), pp. 15ff; Muriel Rukeyser, The Traces of Thomas Harriot (New York: Random House, 1971); and Henry Stevens (of Vermont), Thomas Harriot: The Mathematician, the Philosopher, and the Scholar, Burt Franklin Resource and Source Works Series (1900; rpt. New York: Lenox Hill Publishers, 1972).

³See Shirley, "Sir Walter Raleigh," p. 21.

⁴Wilbur Sanders, The Dramatist and the Received Idea (Cambridge: Cambridge University Press, 1968), p. 2.

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