

## OXFORD BY THE NUMBERS: WHAT ARE THE ODDS THAT THE EARL OF OXFORD COULD HAVE WRITTEN SHAKESPEARE'S POEMS AND PLAYS?

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*Alan Nelson and Steven May, the two leading Oxford documents scholars in the world, have shown that, although many documents connect William Shakspere of Stratford to Shakespeare's poems and plays, no documents make a similar connection for Oxford. The documents, they say, support Shakespeare, not Oxford. Our internal-evidence stylometric tests provide no support for Oxford. In terms of quantifiable stylistic attributes, Oxford's verse and Shakespeare's verse are light years apart. The odds that either could have written the other's work are much lower than the odds of getting hit by lightning. Several of Shakespeare's stylistic habits did change during his writing lifetime and continued to change years after Oxford's death. Oxfordian efforts to fix this problem by conjecturally re-dating the plays twelve years earlier have not helped his case. The re-datings are likewise ill-documented or undocumented, and even if they were substantiated, they would only make Oxford's stylistic mismatches with early Shakespeare more glaring. Some Oxfordians now concede that Oxford differs from Shakespeare but argue that the differences are developmental, like those between a caterpillar and a butterfly. This argument is neither documented nor plausible. It asks us to believe, without supporting evidence, that at age forty-three, Oxford abruptly changed seven to nine of his previously constant writing habits to match those of Shakespeare and then froze all but four habits again into Shakespeare's likeness for the rest of his writing days. Making nine such single-bound leaps from a distant, stylistically frozen galaxy right into Shakespeare's ballpark seems farfetched compared to the conjectural leaps required to take the Stratford case seriously. Note, for example, the supposition that the young Shakespeare, who was entitled to do so, might actually have*

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*attended the Stratford grammar school. It is hard to imagine any jury buying the Oxfordians' colossal mid-life crisis argument without much more than the "spectral and intangible" substantiation that it has received. Ultimately, this argument is too grossly at odds with the available documentary record and stylometric numbers for Oxford to be a plausible claimant.*

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## I. INTRODUCTION: DESPERATELY SEEKING SHAKESPEARE

Who wrote Shakespeare? What did he write? Thousands of books and articles have been written on the first question since the 1900s, doubting that the lowly William Shakspeare, the Stratford glover's son, London bit actor and theater shareholder, could have written the poems and plays of William Shakespeare, the greatest writer of all time.<sup>1</sup> The contrast between Shakspeare's supposedly humdrum, grasping, mercantile documents and the all-surpassing sophistication and learning of Shakespeare's plays has seemed too great for many to believe. Surely, as many have argued, a more credible author would be a traveled, polished, and educated noble like Edward de Vere, the seventeenth Earl of Oxford, today's leading claimant to be the "True Shakespeare."<sup>2</sup> As Sigmund Freud stated, "The man [from] Stratford

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1. The plays and poems of William Shakespeare are often collectively referred to as the "Shakespeare Canon." On our last visit to the World Shakespeare Bibliography in 2001, we counted eighteen pages of references and 533 entries. Fifty-seven percent of these entries asked whether Shakespeare was the Stratford man; 23% concerned his hand in the "Shakespeare Apocrypha," works outside the Shakespeare Canon which have been attributed to Shakespeare at one time or another; and 21% dealt with the "Shakespeare Dubitanda," works inside the Canon for which Shakespeare's authorship has been questioned. See World Shakespeare Bibliography Online, at <http://www.worldshakesbib.org> (last updated July 9, 2004).

2. When we began the Shakespeare Clinic, the case for Oxford was the following: Shakespeare the playwright seemed not only the greatest writer of all time but also a man of tremendous erudition. He had a known vocabulary of more than 17,000 words, a vocabulary twice the size of Milton's and often said to be the largest ever. He appeared educated in law, falconry, heraldry, French, Latin, Greek, and English history. He seemed to have traveled throughout Europe, especially Italy, and to have known the ways of kings and courtiers, as if by first hand. His sonnets were then believed to have been written in the 1590s. They suggest the following about him at that time: (1) that he was in his forties, *Sonnets* 2, 62; (2) that he was lame, *Sonnets* 37, 89; (3) that he had borne an "outward honoring" canopy, *Sonnet* 125; (4) that he had a Dark Lady, *Sonnets* 127-152, and a Fair Youth whom he hoped would have children, *Sonnets* 1-126; and (5) that he might be writing under a pseudonym, *Sonnet* 76. WILLIAM SHAKESPEARE, *Sonnets* (All quotations from and references to the Shakespeare Canon in this Article are from THE RIVERSIDE SHAKESPEARE (G. Blakemore Evans ed., 2d ed. 1997) [hereinafter THE RIVERSIDE SHAKESPEARE].). Shakespeare writes:

Why write I still all one, ever the same,  
And keep invention in a noted weed,  
That every word doth almost tell my name,  
Showing their birth, and where they did proceed?

WILLIAM SHAKESPEARE, *Sonnet* 76. But see *Sonnets* 135-136 (containing ten plays on the word *Will*, including "for my name is *Will*").

In addition, he was extravagantly praised by his contemporaries and hailed by Ben Jonson as the "Soule of the Age!" Ben Jonson, *To the Memory of My Beloved, the Author Mr. William Shakespeare: And What He Hath Left Us*, in the First Folio, reproduced in THE RIVERSIDE SHAKESPEARE, *supra* at 97.

Such an image seemed like a glowing Christmas tree of amazing resemblances to the Earl

of Oxford, who had the upbringing of an earl, held degrees from Oxford and Cambridge, had made the Grand Tour, had lingered long in Italy, was a prominent presence in the Court, bore the Queen's canopy in royal processions, was a published poet in his forties, was lame, was associated with an obvious Dark Lady, Anne Vavasour, and a Fair Youth, Henry Wriothesley, the Third Earl of Southampton and the then-intended match for Oxford's daughter, Elizabeth, from whom he naturally would have hoped for children. See CHARLTON OGBURN, *THE MYSTERIOUS WILLIAM SHAKESPEARE: THE MYTH AND THE REALITY* (1984).

The resemblances to William Shakspeare of Stratford seemed much fewer and less striking. Shakspeare appeared in documents and anti-Stratfordian literature as provincial, obscure, and barely literate. In his will, he devised his second-best bed but mentioned no books or manuscripts. *Id.* at 33-35. His parents and his daughters signed with an "x." His records spoke of births, deaths, marriages, deals in land, corn, malt, stones, and claret, and suits for debts, taxes, coats of arms, and the abatement of dunghills—everything, it seemed, but literary transactions or interests. *Id.* at 30-31. They showed nothing in his life of knowing a Dark Lady or a Fair Youth, being lame, making the Grand Tour, bearing a canopy, or receiving a fine formal education. Shakspeare had just turned thirty, not forty, when the sonnets were then thought to have been written, and he was not known to have been lame. Why all the moaning about "forty winters," *Sonnet 2*, "bare ruin'd choirs," *Sonnet 73*, "decrepit father," *Sonnet 37*, and "Death to me subscribes," *Sonnet 107*, from one who could hardly have experienced such things first-hand?

If one were to judge solely from such selected evidence, Oxford does seem to be a more likely candidate than Shakspeare, if only because he was a more prominent person and had a much fuller record to ornament his Christmas tree with a profusion of fancied resemblances. On the other hand, the same exercise has been performed on other prominent claimants with essentially the same results: One could ornament *their* Christmas trees with long, glowing strings of amazing resemblances to Shakespeare, many more and more glowing than what they could find for Shakspeare of Stratford. See, e.g., ALFRED DODD, *FRANCIS BACON'S PERSONAL LIFE-STORY* 339-47 (1986) (concluding that Francis Bacon wrote the anonymous plays accredited to Shakespeare); CALVIN HOFFMAN, *THE MURDER OF THE MAN WHO WAS 'SHAKESPEARE'* (1955) (arguing that Christopher Marlowe wrote the works accredited to Shakespeare). However, not everyone with a fully decorated Christmas tree can be Shakespeare (unless you subscribe to the group theory, which neither our evidence nor any evidence in the documents supports), and only a few blown circuits turn out all the lights. See *infra* Part III; see generally GILBERT SLATER, *SEVEN SHAKESPEARES* (1931) (espousing the theory that seven writers authored the works of Shakespeare).

Since we began our work, a steady trickle of new documents and studies have shown a number of breaks in the circuit for the Oxford case. See e.g., IRVIN LEIGH MATUS, *SHAKESPEARE IN FACT* (1994); ALAN NELSON, *MONSTROUS ADVERSARY: THE LIFE OF EDWARD DE VERE, 17TH EARL OF OXFORD* (2003) [hereinafter NELSON, *MONSTROUS ADVERSARY*]; Alan Nelson, *Shakespeare Authorship Pages*, at <http://ist.socrates.berkeley.edu/~ahnelson/authorsh.html> (last visited Nov. 13, 2004). These breaks include Oxford's strange, un-Shakespearean spelling and prosody, his grossly overrated academic credentials, his all-consuming self-absorption, and the total lack of direct evidence connecting him with Shakespeare's poems or plays. See MATUS, *supra*; NELSON, *MONSTROUS ADVERSARY*, *supra*. At the same time, the case for Shakspeare has been strengthened by assigning the bulk of the sonnets to the seventeenth century, see STANLEY WELLS & GARY TAYLOR, *WILLIAM SHAKESPEARE: A TEXTUAL COMPANION* 444 (1987); A. Kent Hieatt et al., *When Did Shakespeare Write Sonnets 1609?*, 88 *STUD. PHILOLOGY* 69, 70, 98 (1991), by re-examining old documents linking him to

. . . seems to have nothing at all to justify his claim, whereas Oxford has almost everything.”<sup>3</sup> Otto von Bismarck and Walt Whitman were Stratford skeptics in the nineteenth century. Freud, Mark Twain, and John Galsworthy were prominent anti-Stratfordians of the early twentieth century. They were followed by a host of lawyers, members of Parliament, and Washington notables, including Ambassador Paul Nitze, three U.S. Supreme Court Justices (Justices Stevens, Blackmun, and Powell) and Harvard Professor William Y. Elliott, prominent Tennessean and father of one of the present authors.<sup>4</sup>

The controversy still rages on the Internet, in the media, and among the general public—everywhere, in fact, but in modern English departments. These departments have always considered the question of who wrote Shakespeare to be of interest only to hobbyist amateurs, suitable for the *National Enquirer* or possibly for *Harper’s* but hardly for the *Shakespeare Quarterly*. As a result, until Alan Nelson and Steven May entered the debate, most of the work on this question, not only attacking Stratfordian orthodoxy but also defending it, has been done by amateurs.<sup>5</sup> Some English departments do retain a healthy, informed interest in the second question: “What did Shakespeare write?” However, most trendy, postmodern ones do not. Since the “Death of the Author” was proclaimed in the 1960s, these departments have shunned not only Shakespeare, but every other kind of authorship question.<sup>6</sup> Their search for Shakespeare these days is less than desperate.

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the plays, and by the continued appearance of new ones, see Steven W. May, *The Seventeenth Earl of Oxford as Poet and Playwright*, 72 TENN. L. REV. 221 (2004); Alan H. Nelson, *Stratford Si! Essex No! (An Open-and-Shut Case)*, 72 TENN. L. REV. 149 (2004) [hereinafter Nelson, *Stratford*], and also by the recent discovery by us and David Crystal that Shakespeare’s erudition, as measured by the size of his vocabulary relative to others’ has been grossly overrated. See DAVID CRYSTAL, *THE STORIES OF ENGLISH* 322-29 (2004); Ward E.Y. Elliott & Robert J. Valenza, *Was Shakespeare’s Vocabulary the Greatest?* 21-23 (Oct. 10, 2004) (unpublished manuscript, on file with the *Tennessee Law Review*). Many things that might have seemed mysterious about Shakespeare in 1987 seem less so now. The obverse of our notion that all map-changing Shakespeare authorship documents may have been discovered and exhausted by E.K. Chambers’s time is the fact that new documents continue to appear that do not change the map. Instead, those new documents reaffirm the most basic proposition since Shakespeare’s own time: Shakespeare was the core author and not someone else. Our internal, stylometric evidence is consistent with this long history of documentary evidence.

3. OGBURN, *supra* note 2, at 146 (quoting from Freud’s letter to author John Thomas Looney).

4. See Shakespeare Oxford Society, *The Honor Roll of Skeptics: Questioning the Orthodoxy*, at <http://www.shakespeare-oxford.com/skeptic.htm> (last visited Mar. 11, 2005) (listing prominent Shakespeare sceptics).

5. See, e.g., MATUS, *supra* note 2; Irvin Leigh Matus, *Irvin Leigh Matus’s Shakespeare Site*, at <http://www.willyshakes.com> (last modified July 26, 2004); The Shakespeare Authorship Page, at <http://shakespeareauthorship.com> (last visited Mar. 13, 2005); The Shakespeare Authorship Roundtable: Forum for the Authorship of the Shakespeare Canon, at <http://www.shakespeareauthorship.org> (last visited Mar. 13, 2005).

6. See, e.g., Roland Barthes, *The Death of an Author*, in IMAGE, MUSIC, TEXT 142-48

The general public and especially its lawyerly elites have never bought into postmodernism and are avidly interested in both the *who* and the *what* questions. Dozens of debates have been staged on the *who* question in the United States and Great Britain, many of them at law schools. Before the June 2004 symposium at the University of Tennessee College of Law, the most ambitious debate was a 217-page symposium issue published by the *American University Law Review* in 1988.<sup>7</sup> The Tennessee symposium, however, had a range of talent not available to the 1988 debate. The anti-Stratfordian panelists included three of the Shakespeare Oxford Society's top speakers and writers: Roger Stritmatter, an actual practicing literature professor, and Richard Whalen and Diana Price, both published by respectable presses. Like Freud, these panelists were convinced from years of study that the sublime Shakespeare looks more like the sublime Oxford (or someone else like him) than the lowly Stratford man. The anti-Oxfordian panelists did not include Shakespeare specialists, who shun the topic, but did include the two top Oxford documents specialists in the world, Berkeley's Alan H. Nelson, author of a new Oxford biography, *Monstrous Adversary*,<sup>8</sup> and Georgetown College's Steven May, editor of Oxford's collected poems.<sup>9</sup> Both argued at the symposium, as shown herein, that the Stratford man of record looked more like Shakespeare than the Oxford of record. Oxford, more than Shakspeare, was the one whose letters were grasping and mercantile. His own formal education fizzled out without distinction at age thirteen; his Oxford and Cambridge diplomas turned out to be ceremonial souvenirs, not earned degrees; he always signed himself "Oxenford," never Oxford, as Shakespeare called his ancestors. Nothing in Oxford's record shows any connection with Shakespeare's poems or plays, and his known poems do not look and sound like Shakespeare's at all.<sup>10</sup>

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(Stephen Heath trans., 1977) (1968) (discussing the relationship between an author and his work); Michel Foucault, *What Is an Author?*, in *TEXTUAL STRATEGIES: PERSPECTIVES IN POST-STRUCTURALIST CRITICISM* 141-60 (Josué V. Harari ed., 1979) (discussing what it means to be termed an author). *But see* SEÁN BURKE, *THE DEATH AND RETURN OF THE AUTHOR* (2d ed. 1998) (questioning the "Death of the Author" theory); BRIAN VICKERS, *SHAKESPEARE, CO-AUTHOR: A HISTORICAL STUDY OF FIVE COLLABORATIVE PLAYS* 506-41 (2002) (challenging Foucault's theories on authorship).

7. *In Re Shakespeare: The Authorship of Shakespeare on Trial*, 37 AM. U. L. REV. 609-826 (1988).

8. NELSON, *MONSTROUS ADVERSARY*, *supra* note 2; *see also* Alan Nelson, *OXDOX: Earl of Oxford Documents*, at <http://socrates.berkeley.edu/~ahnelson/oxdocs.html> (last visited Jan. 18, 2005).

9. Steven W. May, *The Poems of Edward De Vere, Seventeenth Earl of Oxford and of Robert Devereux, Second Earl of Essex*, 77 *STUD. PHILOLOGY* 1, 5 (1980).

10. Nelson summarizes his case as follows:

In sum, the First Folio informs us that the playwright William Shakespeare hailed from Stratford-upon-Avon, spent part of his life in Stratford and part in London, served under both Elizabeth and James, belonged to the same fellowship of players as John Heminges

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and Henry Condell, and was one of twenty-six principal actors of the company which first performed his own plays. Moreover, the First Folio tells us that Shakespeare had a limited education (he knew some Latin and less Greek), was a friend of Ben Jonson, was at least an acquaintance of Leonard Digges (also of James Mabbe and Hugh Holland), was buried at Stratford where a funeral monument was erected in his honor, and, finally, was the subject of a eulogy by the poet William Basse, who placed Shakespeare in the company of, but thought him finally superior to, Geoffrey Chaucer, Edmund Spenser, and Francis Beaumont.

By the same token, the First Folio is entirely incompatible with the assumption that Oxford was the author of its thirty-odd plays. Under no circumstances would an earl be called "Maister," not even on the basis of a university degree, earned or unearned. Heminges and Condell could not have publicly or accurately described Oxford as their "fellow." To call Oxford a "servant" of the Herbert brothers would have been an outrage to his rank, not only because all three were earls but because the earldom of Oxford outranked the earldoms of Pembroke and Montgomery. Except in the wildest Oxfordian fantasies, Oxford was not one of the twenty-six "principal *Actors* in *all these Playes*." Oxford had nothing to do with Stratford. He had no monument there and had no connection to the Avon except that he had once owned, but never visited, an estate named Bilton on the Avon, which he sold by the mid-1580s. Finally, Jonson would not have qualified his admiration for a man so socially superior, nor would he have accused an earl, whether true or not, of having had "small Latine, and lesse Greeke."

Nelson, *Stratford*, *supra* note 2, at 156-57.

Likewise, May provides the following argument:

Let me conclude by summarizing what we must believe if we are to accept the Oxfordian hypothesis. Since nothing in Oxford's canonical verse in any way hints at an affinity with the poetry of William Shakespeare, we must believe that Oxford made the leap from his mid-century poetic style to the late Elizabethan style without leaving behind a trace of transitional writing. We must next believe that, after publishing both verse and prose under his own name, the Earl was suddenly afflicted with a manic compulsion for anonymity. This compulsion did not lead him, however, to protest published references to him as a playwright or the on-going publication of verse under his name or initials. He then enlisted, not someone among his own players, but the obscure actor from Stratford to set forth his own creative writing as Shakespeare's work and under his name. We must next believe that De Vere and William took this secret to their graves, that they fooled everyone. We must believe that as Oxford's finances deteriorated in the last decades of his life, he nevertheless permitted his accomplice Shakespeare to enjoy the profits that accrued from the popular and courtly success of both the Earl's plays and his non-dramatic writings. Finally, to be Oxfordians, we must believe that the Earl left Shakespeare a substantial corpus of plays and poems before he expired in obscurity and poverty. Shakespeare then parceled out his patron's work, successfully representing it as his own to the end of his professional career some eight years after Oxford's death. As a result, Shakespeare died well-to-do, if not wealthy, and highly esteemed to this very day for his alleged literary accomplishments. What a tale of clandestine intrigue, bizarre passion, plus the wholesale outwitting of friends, family, colleagues, and acquaintances for over twenty years. Can you believe it?

May, *supra* note 2, at 242.

We have come to the same conclusion about Oxford. Neither he, nor any other claimant we tested, is the True Shakespeare. However, we arrived at this conclusion by a very different route, based not on documents but on a quantitative comparison of Shakespeare's stylistic habits to those of Oxford and others. Our evidence draws on the original work of the Claremont Shakespeare Clinic, a series of student-run teams that worked from 1987 to 1994 and was originally funded by the Sloan Foundation. With much effort and ingenuity, the students put together what could still be the largest common-spelling, computer-ready Elizabethan poem and play archive in existence and developed new computer techniques to shorten the list of credible, testable claimants. Table 1.1 shows their starting point: a list of fifty-eight full and partial claimants, primarily taken from *The Reader's Encyclopedia of Shakespeare*.<sup>11</sup>

Table 1.1. Fifty-Eight Full or Partial Shakespeare Claimants

<i>Alexander, William</i> (1568–1640)	<i>Kyd, Thomas</i> (1558–1594)
* <i>Bacon, Francis</i> (1561–1626)	<i>Lodge, Thomas</i> (1557–1625)
* <i>Bacon, Anthony</i> (1558–1601)	* <i>Lyly, John</i> (1554–1606)
<i>Barnfield Richard</i> (1574–1627)	* <i>Manners, Roger</i> (Rutland)
<i>Barnes, Barnabe</i> (1571–1609)	(1576–1621)
Bernard, Sir John (1605–1674)	Manners, Elizabeth Sidney (d. 1615)
* <i>Blount, Sir Charles</i> (1563–1601)	* <i>Marlowe, Christopher</i> (1564–1593)
Burbage, Richard (1567–1619)	<i>Middleton, Thomas</i> (1580–1627)
* <i>Burton, Robert</i> (1577–1640)	<i>Munday, Anthony</i> (1560–1633)
Butts, William (d. 1583)	<i>Nashe, Thomas</i> (1567–1601)
Cecil, Robert (1563–1612)	Paget, Henry (d. 1568)
<i>Chettle, Henry</i> (1560–1607)	<i>Peele, George</i> (1556–1596)
<i>Daniel, Samuel</i> (1562–1619)	<i>Porter, Henry</i> (fl. c. 1596–99)
* <i>de Vere, Edward (Oxford)</i> (1550–1604)	* <i>Raleigh, Sir Walter</i> (1554–1618)
<i>Dekker, Thomas</i> (1572–1632)	*The Rosicrucians
Devereux, Walter (1541?–1576)	<i>Sackville, Thomas</i> (1536–1608)
* <i>Devereux, Robert (Essex)</i> (1566–1601)	Shirley, Sir Anthony (1565?–1635)
* <i>Donne, John</i> (1572–1631)	* <i>Sidney Herbert, Mary</i> (1561–1621)
<i>Drayton, Michael</i> (1563–1631)	* <i>Sidney, Sir Philip</i> (1554–1586)
* <i>Dyer, Sir Edward</i> (1543–1607)	<i>Smith, Wentworth (William)</i> (fl. c. 1615)
Ferrers, Henry (1549–1633)	* <i>Spenser, Edmund</i> (1552–1599)
<i>Fletcher, John</i> (1579–1625)	* <i>Stanley, William</i> (Derby)
Florio, John (1554–1625)	(1561–1642)
Florio, Michelangelo	Stuart, Mary (1542–1587)
	* <i>Tudor, Queen Elizabeth</i> (1533–1603)

11. THE READER'S ENCYCLOPEDIA OF SHAKESPEARE 115 (Oscar J. Campbell & Edward G. Quinn eds., 1966).



<i>Greene, Robert</i> (1558–1592)	<i>Warner, William</i> (c. 1558–1609)
<i>Griffin, Bartholomew</i> (d. 1602)	<i>Webster, John</i> (1580?–1625?)
* <i>Heywood, Thomas</i> (1574–1641)	Whateley, Anne
The Jesuits	<i>Wilson, Robert</i> (>1572–1600)
* <i>Jonson, Ben</i> (1572–1637)	Wolsey, Thomas Cardinal (1473?–1530)
	*Wriothesley, Henry (1573–1624)

Table 1.1. Twenty-one “full” claimants identified for us by the Francis Bacon Library in Claremont, California are preceded by an asterisk. Thirty-seven tested claimants, fifteen full and twenty-two partial, are italicized. The remaining twenty-one claimants, not italicized, six of them full, have left no known poems or plays to test.

The Claremont students succeeded beyond anyone’s expectations. They shortened the plausible, testable claimant list from thirty-seven to zero, and they eliminated every play and poem of the Shakespeare Apocrypha as Shakespeare’s. Among the rejects was *A Funeral Elegy* by W.S. (“*A Funeral Elegy*”), the great “Shakespeare find” of the 1990s which was touted in all three U.S. Complete Shakespeare Works editions of the decade as “possibly Shakespeare’s”<sup>12</sup> and is only now getting un-touted. When the students announced that their tests eliminated Oxford, Bacon, and Marlowe, they received worldwide media attention. ABC, NBC, BBC, and several other networks covered their report, and *Science* magazine and more than one hundred newspapers here and abroad reported on their findings.

We were co-advisors to the clinic. When the students left, we developed and extended their work into a dozen articles on Shakespeare authorship in leading journals, and we defended it successfully against years of heavy attacks by critics. We are now updating and consolidating the articles into a book, *Shakespeare by the Numbers*.

Our main findings are the following: Shakespeare’s writings do show consistent, countable, profile-fitting patterns, suggesting that, whoever he was, he was a single individual, not a committee. He used more hyphens, feminine endings, and open lines than most others, and fewer relative clauses. His known poems were written between the tenth- and fourteenth-grade level. Other authors’ poems fit some, but not all, of these profiles. However, fitting a Shakespeare profile does not prove your poem is by Shakespeare any more than fitting a size-four slipper proves that you are Cinderella. You could as well be Tiny Tim. But *not* fitting the slipper profile jeopardizes your claim, and your claim is even weaker if you do not fit two, three, or four identifying profiles—not just shoe size but hat size, belt size, and eye color for example.

Our calculations show that the odds of not fitting six profiles in fourteen tests, like *A Funeral Elegy*, or seven profiles, like Oxford’s poems, are

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12. See THE RIVERSIDE SHAKESPEARE, *supra* note 2, at 1893-95.

infinitesimal compared to the farthest outlier block from Shakespeare's own baseline, which has only one narrow rejection. Unless Oxford's writing habits changed abruptly, miraculously, and simultaneously in seven to nine different ways in the 1590s, he cannot be Shakespeare. None of the other claimants' work that we tested could be Shakespeare's work. Additionally, some of the long-disputed parts of the Canon, such as *A Lover's Complaint* and much of *Titus Andronicus*, could not be Shakespeare's work. One or two of the Oxfordian panelists argued that, if writing *Hamlet* and the sonnets were a crime, Oxford would surely be convicted beyond a reasonable doubt. Our findings prove exactly the opposite. Neither the Earl of Oxford nor any other claimant we tested could possibly be guilty of such a thing.

## II. OUR METHODOLOGY

Readers of this journal are aware that, since *Daubert v. Merrell Dow Pharmaceuticals, Inc.*<sup>13</sup> and *Kumho Tire Co. v. Carmichael*,<sup>14</sup> it is no longer sufficient to wave an expert witness's credentials in front of the jury and expect them to swallow his or her conclusions whole. As Michael J. Saks stated:

[I]t would make sense to admit . . . expert evidence only if it meets these conditions: (a) the opinions and conclusions of the expert are accompanied by information that enables the factfinder to evaluate the likely accuracy of the expert's opinion, and (b) the information is presented in such a way that factfinders will not be fooled into excessively overvaluing the testimony.<sup>15</sup>

The authorship controversy has not been litigated much lately, but we would think that the *Daubert* rules as Saks restated them should also apply to a landmark debate on a nontrivial topic. In Part II, we present here a general discussion of the validity of our methods. Part III follows with a specific discussion of how these methods apply to the seventeenth Earl of Oxford, the leading claimant. In Part IV, we set forth our conclusions.

### A. *Quantitative Internal Evidence Versus Qualitative Internal and External Evidence*

Our methodology has five main distinctive features: (1) quantitative internal evidence; (2) clean, commonized baseline; (3) negative evidence; (4) block and profile; and (5) comparative authorship odds. "Quantitative internal evidence" means that our primary scholarly concern was countable

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13. 509 U.S. 579 (1993).

14. 526 U.S. 137 (1999).

15. Michael J. Saks, *The Legal and Scientific Evolution of Forensic Science (Especially Fingerprint Expert Testimony)*, 33 SETON HALL L. REV. 1167, 1167 (2002-2003) (footnote omitted).

stylistic markers that might give us a clearer notion of authorship. “Stylometry” is a word sometimes used to describe work like ours. We often took our bearings from conventional, qualitative scholarship based on soft, internal evidence—perceived “borrowings” and literary parallels between one writer and another—and on external documentary evidence.<sup>16</sup> We performed our tests as consumers, not producers, of conventional qualitative judgments and documentary research.

In one sense, this could be a terrible disadvantage. Even we believe that full authorship analysis requires a look at both right-hand (qualitative judgments and external documents) and left-hand (internal, countable stylistic patterns) evidence, as well as some admixture of interpretive skills and intuition before one can claim to have exercised due diligence. From this perspective, if from no other, we are incorrigible lefties.<sup>17</sup> By the same token, we have encountered many lawyers and literature department people, perhaps the very ones we are trying to reach in this Article, who are incorrigible righties; they find counting of any kind uninteresting and serious counting with statistics and computers perverse, soulless, abhorrent, and unprofessional. They are like the elders of the University of Göttingen in the eighteenth century who described the *Tabellenknechte* as “slaves to the tabular form of presentation, who g[i]ve only the dry bones of statistics without clothing them with the flesh of descriptive reality.”<sup>18</sup> Their model of excellence is John Henry, the legendary steel driver who outperformed the steam drill and died with his hammer in his hand.

For some purposes they are right. The handcrafting man still can do some tasks better; on the other hand, how many of our handcrafters still write out their thoughts in longhand with a quill pen? In 1966, just before the “Death of the Author” was proclaimed, there was a major exchange between the external-evidence righties<sup>19</sup> and the internal-evidence lefties<sup>20</sup> over whose

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16. External evidence for Shakespeare includes the works of Henslowe and Meres, the Stationer’s Register, and the Folios and Quartos. *See also* S. SCHOENBAUM, *SHAKESPEARE’S LIVES* (new ed. 1991) (discussing Shakespeare documents); WELLS & TAYLOR, *supra* note 2 (evaluating external and internal evidence of Shakespeare authorship of various works).

17. Among internal-evidence people, we are the ones who like to count things easy to count—grade-level, hyphenated compound words, feminine endings, and the like—rather than things that are hard to count—literary parallels, echoes of other writers, shared imagery and allusions, or use of “distinctive” rhetorical figures. In terms of our conclusions, we should be classified as “disintegrationists,” people who doubt that Shakespeare wrote everything in the Canon, rather than as “integrationists,” those who think Shakespeare wrote it all, and as “Stratfordians” rather than “Anti-Stratfordians.”

18. HARALD WESTERGAARD, *CONTRIBUTIONS TO THE HISTORY OF STATISTICS* 14 (1932).

19. *See, e.g.,* S. SCHOENBAUM, *INTERNAL EVIDENCE AND ELIZABETHAN DRAMATIC AUTHORSHIP: AN ESSAY IN LITERARY HISTORY AND METHOD* (1966).

20. *See, e.g.,* Arthur Sherbo, *The Uses and Abuses of Internal Evidence*, in *EVIDENCE FOR AUTHORSHIP: ESSAYS ON PROBLEMS OF ATTRIBUTION* 559 (David V. Erdman & Ephim G. Fogel eds., 1966).

evidence was more important, and each side issued a fatwa downgrading the other. We do not think such fatwas settle much. Some issues are best settled with documents, others with counting. The normal expectation is that you need to consider both. External evidence and qualitative judgments have been the default for many years, have received most of the serious scholarly attention, and have normally provided the starting point for quantitative, internal-evidence exploration like ours, not the reverse.<sup>21</sup>

On the other hand, qualitative, aesthetic judgments tend to be subjective and inconclusive and can only take you so far before someone of equal reputation disagrees with you.<sup>22</sup> Documentary evidence, where available, can be more telling. For Shakespeare, however, the documentary map still has many blank and gray spots and has not been changed much lately by new discoveries.<sup>23</sup> Stated differently, possibly because it has been the default for so long, external evidence appears much closer to being mined out than internal evidence. Do today's Shakespeare scholars have a single major document bearing on what belongs in the Canon that was not available to E.K. Chambers, who completed his magnum opus in 1923?<sup>24</sup> It is easy enough to recall the excitement over "discoveries" such as *Shall I Die?*,<sup>25</sup> *A Funeral Elegy*,<sup>26</sup> and the *Levi Poem*,<sup>27</sup> with or without the provisos that they all were reassessments of already-known documents and that they all turned out to be wrong. It is much harder to recall a document discovered since Chambers's time that has actually changed the Shakespeare authorship map for the better.

Hence, there is a nagging feeling that most of the easy questions that documents could settle conclusively were answered in Chambers's time, and only the harder, gray-area questions that the documents cannot settle remain—just enough to fuel either endless reassessment or a general boredom with authorship among the cognoscenti but never quite enough to fill in the blank spots. Therefore, anyone who wants to make headway has only three

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21. Perhaps significantly, when moderator Professor Judy Cornett asked the panelists of the Tennessee symposium what kind of evidence they thought might clinch the case for or against the Stratford man, almost everyone answered external evidence, such as a signed manuscript or, in our case, a signed, sealed, sworn, notarized affidavit from Shakespeare that he did or did not write the poems and plays. As we state in our conclusion, we doubt that even such an improbable smoking-gun document would end the controversy.

22. See, e.g., E.K. CHAMBERS, 4 ELIZABETHAN STAGE 9 (1923) ("The theory [that Shakespeare wrote *Edward III*] has received much support, largely owing to the assent of Tennyson, against whose authority, however, may be set that of Swinburne.").

23. Mark Twain once compared the Shakespeare record to a much-reconstructed brontosaurus skeleton: "We had nine bones, and we built the rest of him out of plaster of paris." MARK TWAIN, 1601, AND IS SHAKESPEARE DEAD? 41 (Oxford Univ. Press 1996) (1882, 1909 respectively).

24. CHAMBERS, *supra* note 22.

25. WELLS & TAYLOR, *supra* note 2, at 450-55.

26. See *supra* text accompanying note 12.

27. P. LEVI, THE LIFE AND TIMES OF WILLIAM SHAKESPEARE 345 (1988).

choices: (1) wait and hope that something new and promising will turn up for Shakespeare, as it occasionally still does for other authors; (2) try yet another reassessment of the same old inconclusive external evidence; or (3) attempt to accomplish with computers what Galileo and van Leeuwenhoek did with the improved optics of their time—that is, use them to examine previously unobservable internal evidence and substitute observation for what had at that time been nothing but conjecture. We chose the third course, and it has produced some observations that could provide us with a much sharper view of certain questions that were gray or blank spots before our new optics came along.

### B. Clean, Commonized Baseline

As consumers of Chambers via Donald Foster and *The Riverside Shakespeare* (“*Riverside*”), we did our best to start with pure Shakespeare, externally and conventionally defined, as our basis of comparison and to edit it carefully to modernize and commonize the spelling, strip the text of speech headings and stage directions, separate prose and verse, and otherwise to make it fit for computer analysis. With the help of Donald Foster, our initial advisor, we first purged our baseline of every play or passage he (relying chiefly on the *Riverside*) considered suspect.<sup>28</sup> Roughly speaking, this completely eliminated three and a half jointly authored plays from baseline: *Henry VI, Part I*; *Timon of Athens*; *Two Noble Kinsmen*; and *Henry VIII*. This reduced the baseline from thirty-eight to thirty-five plays. Two of these, Shakespeare’s parts of *Two Noble Kinsmen* and *Pericles*, were partial.<sup>29</sup>

Subsequently, several developments compelled us further to cleanse and shorten our baseline list. We gained further confidence in our tests and we found cases that showed strong internal evidence of co- or other-authorship, notably *A Lover’s Complaint*; *Titus Andronicus*; *Henry VI, Part III*; and portions of co-authored plays that Foster’s authorities had ascribed to Shakespeare. With a bit of prompting from modern screenwriters, we lost confidence in the convenient notion that co-authors always divide their work neatly by act and scene to make it easier for stylometrists to tell who wrote

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28. Foster recommended the following cuts from the Shakespeare Canon: *Macbeth*: act 3, sc. 5; act 4, sc. 1, lines 39-43, 125-32; (2) *Pericles, Prince of Tyre*: acts 1-2; (3) *Henry VIII*: act 1, sc. 3-act 1, sc. 4, line 64; act 1, sc. 4, line 64-act 2, sc. 2; act 3, sc. 1; act 3, sc. 2, lines 203-349; act 4, sc. 1; act 4, sc. 2, lines 83-108; act 5, sc. 2, lines 1-182; act 5, sc. 3-act 5, sc. 4; epilogue; (4) *Two Noble Kinsmen*: act 1, sc. 5; act 2, sc. 2-act 2, sc. 6; act 4, sc. 1-act 4, sc. 2; act 4, sc. 3, lines 1-57; act 5, sc. 1, lines 1-33; act 5, sc. 2; epilogue; (5) *Timon of Athens*: the entire play; (6) *Henry VI, Part I*: the entire play.

29. *Edward III* now appears in several recent Shakespeare anthologies. However, it was not in the Canon when we started, and we do not think it belongs in a clean baseline now. The Hand D section of *Sir Thomas More*, see THE RIVERSIDE SHAKESPEARE, *supra* note 2, at 1775-94, like *The Phoenix and Turtle*, is too short to put in a baseline; we also doubt that it is Shakespeare’s.

what. We also adopted two new systems for calculating the relative odds of Shakespeare authorship of any given text, neither of which makes much sense absent a clean baseline. Finally, our baselines get oven-baked after the umpteenth layer of our analysis and cannot easily be unmixed retroactively. All of these factors supported the decision to start with a short, clean baseline and discouraged the use of a long baseline filled with an indiscriminate mixture of doubtful and not-so-doubtful texts.

In every case where our computer told us a Shakespeare-ascribed text was suspect, we rechecked the suspect passages against conventional scholarship, especially Wells and Taylor's *William Shakespeare: A Textual Companion*.<sup>30</sup> With one easily distinguishable exception,<sup>31</sup> we found that conventional scholars also held the Shakespeare ascription in doubt, and again we resolved the doubts in favor of a cleaner baseline. We moved all of these newly-questionable plays—*Henry VI, Parts II & III*; *Titus Andronicus*; *Pericles*; *Two Noble Kinsmen*; and *Henry V*—to a category we call “Dubitanda and Set-Asides,” further cutting the baseline from thirty-four to the twenty-nine plays listed in Appendices One through Five. The final result is that we kept twenty-nine plays in the clean, single-authored baseline, and we moved nine to Dubitanda and Set-Asides.

Using a similar process, driven by strong internal evidence, lack of strong, contradictory external evidence, and the softness of the scholarly consensus to the contrary, we also removed *A Lover's Complaint* from our Shakespeare poem baseline. We have found no reason to move any claimant or apocrypha poem or play we tested in the opposite direction—into the Shakespeare baseline. In particular, we are not persuaded that Shakespeare wrote any part of *Shall I Die?*, *A Funeral Elegy*, or *Edward III*. People may legitimately differ as to how clean the baseline should be,<sup>32</sup> but especially with our new

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30. WELLS & TAYLOR, *supra* note 2.

31. The most arguable exception to our list of disputed texts is *Henry V*. As far as we know, no one doubts from any external evidence that Shakespeare wrote the English parts. On the other hand, no one knows whether someone, perhaps Christopher Mountjoy, the Huguenot landlord of his lodgings on Silver Street, Cripplegate, helped Shakespeare with the French sections, *see* ANTHONY BURGESS, SHAKESPEARE 170 (1970), or whether Shakespeare even wrote them at all. Hence our term “set-aside.” Common sense, consultation with modern screenwriters, and our own experience preparing Latin orators for Claremont McKenna College graduations all support the conclusion that collaboration is especially likely where foreign languages are involved.

Thomas Merriam believes from internal evidence of “intertextual distance” that the verse passages of *Henry V* differ significantly from the rest of Shakespeare, including the prose passages of *Henry V*. He concludes that “[t]his feature reinforces previous doubt cast on the authorial integrity of the play.” Thomas Merriam, *Intertextual Distances Between Shakespeare Plays, with Special Reference to Henry V (Verse)* 9 J. QUANTITATIVE LINGUISTICS 261, 261 (2002). However, he cites no external evidence supporting this view.

32. *See* Ward E.Y. Elliott and Robert J. Valenza, *So Many Hardballs, So Few of Them Over the Plate*, 36 COMPUTERS & HUMAN. 455 (2002) [hereinafter Elliott, *So Many Hardballs*];

calculations of relative authorship odds, we believe that it is much easier, both expositionally and in terms of sound methodology, to start with a truly firm, clean baseline and consider adding problematic texts one at a time, than to start by baking the problematic texts irretrievably into a contaminated, distorted baseline pie.

### C. "Silver-Bullet" Negative Evidence

None of our individual tests are perfect in the way that fingerprint and DNA evidence are considered perfect for having zero false negatives and zero false positives. Our tests are more like comparing shoe sizes, blood typing, or eye color than comparing fingerprints. If our tests are defined and measured properly, they will show tons of false positives but no more than ounces or pounds of false negatives. We believe that negative evidence normally outweighs positive evidence by many orders of magnitude. As noted, fitting the tiny slipper does not prove you are Cinderella nearly as conclusively as *not* fitting the tiny slipper proves you are *not* Cinderella. If you are a size four, you could just as well be a false-positive Little Miss Muffet or Tiny Tim; but, if you are a size ten, your claim to be Cinderella is in trouble. The trouble is compounded, and the disproof stronger, for every additional profile you do not fit—hat size, height, eye color, or blood type—making it easy to eliminate a Cinderella claimant even if uncanny numbers of other measurable features—sex, ring size, hair color, inseam, resting pulse rate, cholesterol level, or blood pressure—seem to match exactly. Hence, our distinguishing stock-in-trade has been "silver-bullet" negative evidence that tends to disprove common authorship by showing differences, rather than "smoking gun" positive evidence used by most other analysts to prove common authorship with similarities such as "borrowings" or "echoes."<sup>33</sup>

In practice, this means that if one of our tests produces 70% false positives from a given set of non-Shakespeare text blocks, it does not affect our results. Obtaining true rejections for the remaining 30% is more than enough payoff to justify the test for our purposes because we have set our baseline profiles to insure that false negatives are kept to a reasonable minimum. As a rule, we have tried to set our profiles to result in a "could be" for at least 95% of Shakespeare (or other) baseline blocks tested. Ninety-five percent is a floor,

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Donald W. Foster, *The Claremont Shakespeare Authorship Clinic: How Severe Are the Problems?*, 32 *COMPUTERS & HUMAN* 491, 497-501 (1999) [hereinafter Foster, *Authorship Clinic*]; Donald W. Foster, A Funeral Elegy: by W[illiam] S[hakespeare]'s "Best-Speaking Witnesses," 111 *PUBL'NS MOD. LANGUAGE ASS'N AM.* 1080, 1082 (1996) [hereinafter Foster, "Best-Speaking Witnesses"]; Ward E.Y. Elliott & Robert J. Valenza, *So Much Hardball, So Little of It Over the Plate: Conclusions from Our "Debate" with Donald Foster* (Oct. 26, 2002), at <http://govt.claremontmckenna.edu/welliott/hardball.htm>.

33. See William Boyle, *Smoking Guns and Silver Bullets*, *SHAKESPEARE OXFORD NEWSL.* (Shakespeare Oxford Soc'y, Malden, Mass.), Summer 1997, at 20.

not an average. When we count every test run, on every core baseline Shakespeare play, we find 98% true positives and only about 2% false-negative Shakespeare rejections. Applying the same process to fifty-one plays mostly by claimants produces 65% false-positive results. We ignore this result because false-positive results do less to prove a Shakespeare ascription than false-negative results disprove it, and 35% true negatives, with a bit of aggregation, are more than enough to rule out all fifty-one plays as Shakespeare's solo work.

Our first aggregation is to count our results play by play, rather than test by test. When we do this, we find that no core Shakespeare baseline play has more than two individual rejections (shaded aqua) in forty-eight tests,<sup>34</sup> while no "Claimant" play has fewer than ten rejections.<sup>35</sup> Our second aggregation is to use the two methods discussed under "Comparative Odds" below to estimate the composite odds, given what we now know about Shakespeare's countable traits, that he could have written by chance a play like Marlowe's *Edward II* that has only ten rejections. It is important to note here that, whenever we say "written by chance" in lay language, we are actually talking about something more technically qualified for numerate readers. We refer to the odds that the specific features for which we test could have arisen by chance assuming the statistics and modeling that we have imputed to the baseline. The odds for the least improbable Claimant play are somewhere between 2,258 and 17.3 million times worse than the odds that Shakespeare could have written the farthest outlier in his own core baseline.<sup>36</sup>

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34. See Appendix One (Shakespeare): Core Shakespeare Play Baseline Discrimination Summaries.

35. See Appendix One (Claimants): Claimant Play Discrimination Summaries; Appendix Two: Claimants Versus Shakespeare Baseline, Three-Round Composite Scores.

36. Here are the calculations, aimed at the modal, math-challenged layperson. For "Discrete" odds, Shakespeare's most distant core-baseline outlier is *The Tempest*, with two "Discrete" rejections in forty-eight tests. See Appendix One (Shakespeare); Appendix Two: Shakespeare Play Baseline Data, Three-Round Composite Scores. The odds that any test block would get two "Discrete" rejections in forty-eight tests, given a 1.9% error rate among all tests, are about 23%, or, in scientific notation, 2.316 times  $10^{-1}$ . The nearest "Claimant" match to baseline Shakespeare is Marlowe's *Edward II*, which gets ten "Discrete" rejections in forty-eight tests. The odds of this, with the same 1.9% Shakespeare error rate, are 0.00000001337 or 1.337 times  $10^{-8}$ . The value of 0.2316 divided by 0.00000001337 equals 17,322,364, which means that *Edward II* is 17.3 million times less likely to have come from Shakespeare's pen by chance than *The Tempest*.

For "Continuous" odds, *The Tempest* is also Shakespeare's most distant core baseline outlier, with a Continuous Composite Shakespeare Probability of 3.689 times  $10^{-3}$ , or 0.0037. The closest "Claimant" match by this measure is Thomas Heywood's *A Woman Killed With Kindness*, with a Continuous Composite Shakespeare Probability of 1.6337 times  $10^{-6}$ , or 0.000006337. The value of 0.0037 divided by 0.000006337 equals 2,258. This means that *A Woman Killed With Kindness* is 2,258 times less likely to have come from Shakespeare's pen by chance than *The Tempest*. For further details on how we calculate "Continuous" odds of



We are aware that such aggregation, which can make non-Shakespeare look decisively unlike Shakespeare, might arguably be invoked in reverse to show that a given Shakespeare play or poem looks decisively like Shakespeare. For instance, with a bit of aggregation, you could find enough “unique similarities” to light up a Christmas tree and thereby prove Shakespeare authorship almost as conclusively as you could disprove it. For example, what if you find someone who has a shoe size and twelve other measurable features that all fall within Shakespeare’s ranges, and he and Shakespeare are the only ones found who fit all of those profiles? Would that not be about five coincidences too many for it not to be Shakespeare? Would it not almost mean that he has to be Shakespeare? And if you could say that about aggregating the physical particulars of Shakespeare the man, could you not also say the same about aggregating the stylistic particulars of a hypothetical newly discovered Shakespeare play, such as a manuscript in Shakespeare’s handwriting bearing over 18,000 supposedly uncanny resemblances to Shakespeare’s and Fletcher’s lost play, *Cardenio*? Would that not reveal that it was his?<sup>37</sup>

The short answer is that it depends on how far you looked before you decided that Shakespeare was the only multiple-fit to be found. If you have looked at millions of fingerprints or DNA samples and found no two alike, you can talk about perfect, positive evidence; however, there are those who think that even fingerprints are open to question because the science behind them has been less thoroughly examined in court than DNA testing.<sup>38</sup> But we have seen too many overreaching claims of exhaustive due diligence that wilted when the sun came out, and too few that have not, for us to be comfortable with such claims.

Examples of such “Christmas trees full of unique quirks equals proof” claims abound in anti-Stratfordian tracts,<sup>39</sup> but they are also the principal

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common authorship, see *infra* Part II.E.

37. Or, as R.W. Chambers put it, “‘You have to meet in a crowd a Mr. Harris, hitherto unknown to you, but who, you are informed, has red hair, wears a monocle, and walks with a limp.’” MACD. P. JACKSON, *DEFINING SHAKESPEARE: PERICLES AS TEST CASE 192* (2003) (quoting R.W. Chambers, *The Expression of Ideas—Particularly Political Ideas—in the Three Pages, and in Shakespeare, in SHAKESPEARE’S HAND IN THE PLAY OF SIR THOMAS MORE* 142 (1923)). In 2003, MacDonald Jackson offered this piercing critique of Chambers’s argument:

We might even reckon probabilities—one in ten men is left-handed, one in eight wears a moustache, and so on—and enlarge the list to the point where multiplying the separate odds would produce a billion-to-one coincidence. Harris must have met his *doppelgänger*! No, the passer-by is a stout Caucasian and Harris is a slim West Indian. The total absence of constraints on our search for resemblances renders the calculation meaningless.

*Id.*

38. See Saks, *supra* note 15, at 1170 (suggesting that fingerprint evidence does not meet *Daubert* standards and noting that “the field of fingerprint identification has thus far failed to systematically test its underlying assumptions and its claims of expertise”).

39. See e.g., DODD, *supra* note 2; WILLIAM P. FOWLER, *SHAKESPEARE REVEALED IN*

evidence in more respectable tracts, perhaps because they do not require the vast exercises of building, blocking, and profiling baselines that we favor and can only be done conveniently with computers. For example, consider Donald Foster's now-abandoned claims that hendiadys, incongruous *who*'s, and redundant comparatives and superlatives found in *A Funeral Elegy* were like "thumbprints" of Shakespeare. Foster also claimed that *A Funeral Elegy* fit Shakespeare's rare-word peaking patterns identified by Shaxicon so perfectly that it "cannot have been written by anyone other than Shakespeare."<sup>40</sup> The resemblances between *A Funeral Elegy* and Shakespeare were many, remarkable, and often real, and they seemed unique at first glance. But it turned out that they were not, and the smoke from the supposed smoking-gun "proofs" vanished when Brian Vickers's mighty '*Counterfeiting*' *Shakespeare*<sup>41</sup> loomed on the horizon and the ascription itself collapsed.

The claimed *Cardenio*, as it happens, is not just a hypothetical. Charles Hamilton, a respected handwriting analyst, found what appeared to be Shakespeare's handwriting and dozens of other Shakespeare "echoes" and "borrowings" in the manuscript to *The Second Maiden's Tragedy* and pronounced it the lost play.<sup>42</sup> Consider, for example, the remarkable resemblance in Figure 2.1 between the top example of each pair, which Hamilton took from Shakespeare's will, and the bottom example, taken from *The Second Maiden's Tragedy* manuscript.<sup>43</sup>

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OXFORD'S LETTERS (1986); HOFFMAN, *supra* note 2; OGBURN, *supra* note 2. But see May, *supra* note 2, at 223; Carol Boettger, *That Way Madness Lies: Elegy Conference in LA Still Leaves Questions*, SHAKESPEARE OXFORD NEWSL. (Shakespeare Oxford Soc'y, Malden, Mass.), Summer 1996, at 2.

40. See DONALD W. FOSTER, *ELEGY BY W.S.: A STUDY IN ATTRIBUTION* (1989) [hereinafter FOSTER, *ELEGY BY W.S.*]; Foster, "*Best Speaking Witnesses*," *supra* note 32; Posting of Donald Foster, foster@vassar.edu, to editor@shaksper.net (June 13, 2002), at <http://www.shaksper.net/archives/2002/1484.html> (on file with the *Tennessee Law Review*) [hereinafter Posting of Donald Foster].

41. BRIAN VICKERS, '*COUNTERFEITING*' SHAKESPEARE: *EVIDENCE, AUTHORSHIP, AND JOHN FORD'S FUNERALL ELEGY* (2002).

42. See CHARLES HAMILTON, *WILLIAM SHAKESPEARE AND JOHN FLETCHER: CARDENIO OR THE SECOND MAIDEN'S TRAGEDY* (1994).

43. *Id.* at 139.

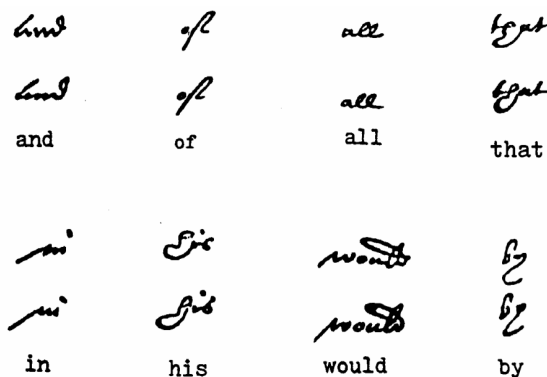
Figure 2.1. Purportedly Uncanny Resemblances Can Deceive<sup>44</sup>

Figure 2.1. The manuscript to *The Second Maiden's Tragedy* has strikingly similar handwriting to that found in Shakespeare's will, but Shakespeare did not write *The Second Maiden's Tragedy*.

Despite its many remarkable Shakespeare resemblances, *The Second Maiden's Tragedy* is anything but a likely Shakespeare play. It received twenty-two rejections in forty-eight tests, one of the worst scores of any play. The likelihood of Shakespeare authorship, by both of our comparative odds reckonings, was too low to compute with standard-issue, double-precision desktop computer software.

Hence, we avoid the use of terms like “fingerprints” or “thumbprints” to describe our work because their implications of conclusive, positive proof are misleading when applied to imperfect tests—the only kind we have seen for Shakespeare. Imperfect tests remain much better at disproving than proving.

#### D. Block and Profile: Sample Length Matters

Profiles are what we use to disprove common authorship. You cannot make a valid exclusion unless you have valid standards of inclusion. Profiles imply such standards, and lawyers, in particular, spend their lives arguing over which ones to apply and with what degree of consistency and rigor.<sup>45</sup> Quantified stylometric profiles make little sense unless they are well controlled for text length because of the law of large numbers: longer texts are more orderly and predictable because they average out more variance. For

44. Figure 2.1 is adopted from HAMILTON, *supra* note 42, at 139. From *Cardenio, or The Second Maiden's Tragedy*, by Charles Hamilton, with permission of Glenbridge Publishing Ltd.

45. See generally FREDERICK SCHAUER, PROFILES, PROBABILITIES, AND STEREOTYPES ix (2003) (defending “the morality of decisions by categories and by generalizations”).

instance, no one can predict what an individual or small group of people will eat on a given night, but in order to anticipate how much food and how many employees they will need to meet the demand, restaurants can predict what large numbers of people on large numbers of nights will eat. It is the same for grade-level, hyphenated compound words, new words, and other stylistic indicators. Patterns that are hidden in small numbers become more and more manifest as the numbers get larger. If a population of test outcomes forms a normal distribution curve, or bell curve, the curve should be tighter and more symmetrical for a larger sample than for a smaller one and, as a result, be more useful for distinguishing the measured trait.<sup>46</sup>

Figure 2.2. Longer Blocks, Narrower Ranges

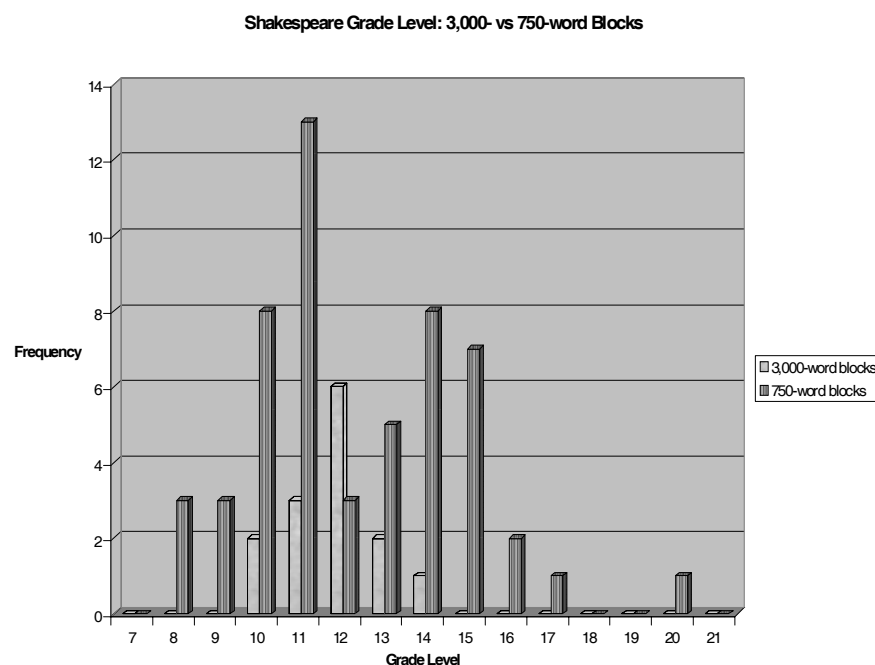


Figure 2.2. Shakespeare Poem Grade Level Profiles for 3,000- and 750-Word Text Blocks. Three thousand-word text blocks (light bars) yield less sprawling, more useful profiles than shorter, 750-word ones (dark bars).

This means that we received our clearest and best results with our longest text blocks, and it explains why we have organized our data<sup>47</sup> by block length first and by genre second. We were able to validate forty-eight tests with play-length text blocks of 15,000 to 30,000 words. For text blocks of around 3,000

46. See Figure 2.2.

47. See Appendices One through Nine.

words, we could only validate fifteen tests.<sup>48</sup> For text blocks of 470 words, we could validate only eleven tests.<sup>49</sup> Close examination of the ranges for the same test, such as grade level, shows that the ranges become broader and less exclusive with each diminution in block size. Hence, we routinely block text by size before profiling, referring to the processes as “block and profile.” Table 2.1 summarizes the ranges for our most important small-block tests, sorted by block length and genre.

Table 2.1. Profile Ranges for Selected Tests,  
Sorted by Block Length and Genre

		whole play	3000 word poem	3000 word play verse	1500 word poem	1500 word play verse	750 word poem	750 word play verse	470 word poem
grade level	min	4	10	3	10	4	8	3	8
	max	7	14	8	16	9	16	10	18
HCW/20k	min	52	31	31	24	24	24	26	0
	max	180	153	153	243	243	268	236	240
Rel. Cl.	min		7						
	max		17						
Fem. End.	min	8	7	7	3	3	3	3	3
	max	22	25	25	29	29	28	28	40
FE early	min	8							
	max	17							
FE middle	min	8							
	max	20							
FE late	min	17							
	max	22							
Open lines	min	11	9	9	7	8	6	6	7
	max	50	57	57	24	55	51	51	28
OL early	min	11	9	9	7	8	6	6	
	max	23	33	33	24	33	32	32	
OL middle	min	16							
	max	32							
OL late	min	31	15	15	13	13	12	12	
	max	50	57	57	23	55	51	51	

48. See Appendix Six for fourteen of these tests.

49. See Appendix Nine.

Enclitics	min		27	27	18	18	10	10	17
	max		89	89	123	123	137	137	196
Proclitics	min		265	265	235	235	152	152	183
	max		476	476	561	561	510	505	589
with (2lws)	min	9	4	4					
	max	21	36	36					
no/no+not	min	242	167	167			100		0
	max	358	536	586			667		800
BOB 5	min	159	116	116	93	93	59	63	55
	max	487	556	556	761	761	750	712	805
BOB 7	min	278	136	136	0	0	-146	-146	0
	max	779	944	944	1000	1000	1000	1000	1000
BOB 8	min		-867	-867	-889	-889	-929	-929	-1000
	max		-265	-265	-209	-209	-142	-83	-167
TE slope	min	-0.13	-0.22	-0.22	-0.22	-0.22			
	max	0.06	0.15	0.15	0.15	0.15			
TE NW	min	-14	-32	-32	-24	-24			
	max	5	21	21	12	12			
TE RW	min	-2		-33		-40			
	max	89		218		116			
Bucket	min	-2		-72		-77		-69	
	max	2		29		100		81	
Modal	min		281		79		-11		-35
	max		1149		407		189		154
Discrete		2.9	3.1	2.9	2.7	2.5	3.6	3.4	4.4
	max	E-01	E-01	E-01	E-01	E-01	E-01	E-01	E-01
Continuous		8.9	9.0	1.8	1.2	3.8	6.2	1.2	3.2
	max	E-03	E-02	E-01	E-01	E-01	E-02	E-01	E-01

Table 2.1. Profile ranges tend to widen as block size decreases.

*E. Finding the Comparative Odds of Shakespeare Authorship*

After blocking, testing, and profiling, as Figure 2.2 shows, this process yields a set of ranges more or less resembling bell curves. Figure 2.3 shows three overlapping, idealized bell curve examples.<sup>50</sup> The curves represent the relative number of college graduates and non-college graduates plotted against their corresponding standard deviations from the IQ mean of the whole population. A normal population is distributed as follows: about two thirds of the population fall within one standard deviation from the population's average, or mean; 95% fall within two standard deviations from the mean;

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50. RICHARD. J. HERRNSTEIN & CHARLES MURRAY, *THE BELL CURVE: INTELLIGENCE AND CLASS STRUCTURE IN AMERICAN LIFE* 46 (1994).

99.7% fall within three standard deviations from the mean; and so on.<sup>51</sup>

Figure 2.3. Some Perfect Bell Curves<sup>52</sup>

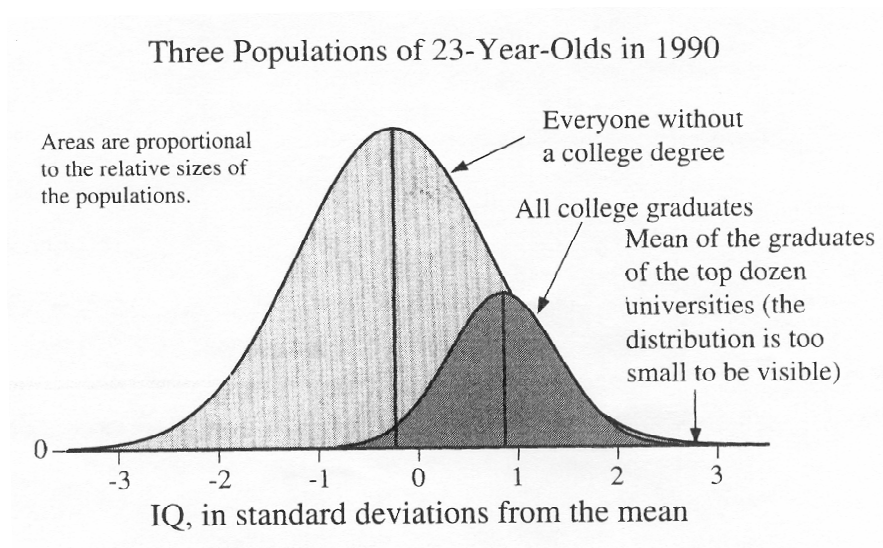


Figure 2.3. Almost all college graduates have above-average IQs. Graduates of the top dozen universities in 1990 had IQs almost three standard deviations above average. Conversely, very few people with an IQ more than one standard deviation below average graduated from college.<sup>53</sup>

Figure 2.3 shows that having an IQ one standard deviation above average, or even two, is no guarantee that you have graduated from college. Like fitting Cinderella's shoe, such positive evidence of a higher IQ is inconclusive as to graduation status. But if your IQ is one standard deviation *below* average, the odds that you have graduated from college are very low, and the odds are lower yet if your IQ is two standard deviations below average. In other words, a low IQ is much more closely associated with not having graduated from college than a high IQ is with having graduated from college.

Figure 2.4 shows two actual profiles of *of*'s per 4,300-word block.<sup>54</sup>

51. *Id.* at 44.

52. Figure 2.3 is adopted from HERRNSTEIN & MURRAY, *supra* note 50, at 46. Reprinted with permission of The Free Press, a Division of Simon & Schuster Adult Publishing Group, from *The Bell Curve: Intelligence and Class Structure in American Life* by Richard J. Herrnstein and Charles Murray. Copyright © 1994 by Richard J. Herrnstein and Charles Murray.

53. *Id.* at 46.

54. Figure 2.4 is adopted from Ward E.Y. Elliott & Robert J. Valenza, *Smoking Guns and Silver Bullets: Could John Ford Have Written the Funeral Elegy?*, 16 LITERARY & LINGUISTIC COMPUTING 205, 208 (2001) [hereinafter Elliott & Valenza, *Smoking Guns*]; see also WARD

Shakespeare's combined range from all ten blocks of his poems, and nineteen more from his late play verse, is 46 to 108 *of*'s per block; Ford's range for five poem blocks is 143 to 220. The frequency of *of*'s per 4,300-word block for each author is less than perfectly symmetrical, but more importantly, they do not overlap at all. On average, Ford uses twice as many *of*'s per block as Shakespeare. *A Funeral Elegy*, with 145 *of*'s, falls far outside of Shakespeare's range, but just within Ford's. Common sense and a host of other such indicators suggest that it is much more likely to be Ford's than Shakespeare's.<sup>55</sup>

Figure 2.4. Shakespeare's and John Ford's Profiles of *of*'s per 4,300-Word Block

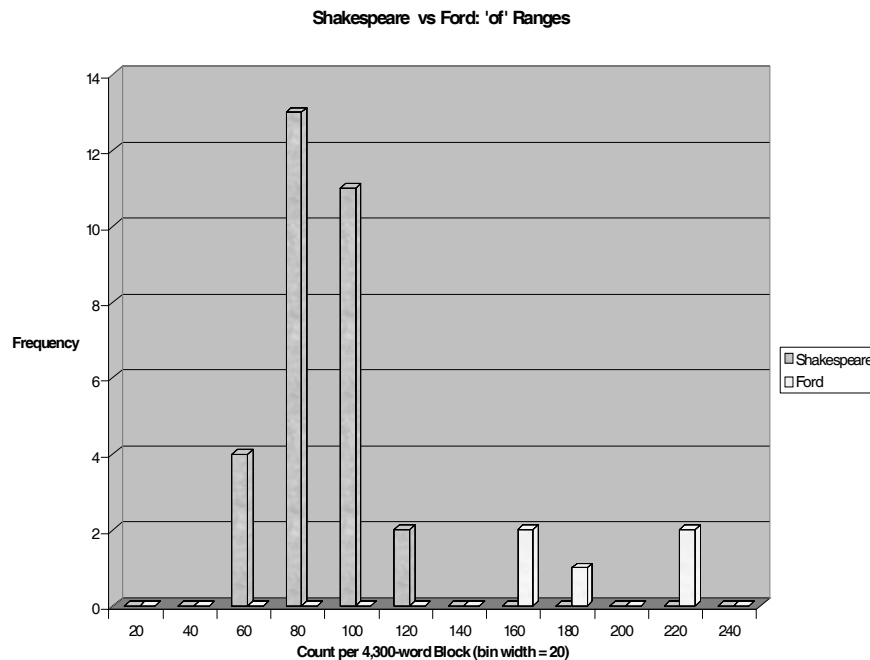


Figure 2.4. Shakespeare's and Ford's *of* ranges of 46 to 108 (darker bars) and 143 to 220 (lighter bars), respectively, do not overlap. *A Funeral Elegy*, with 145 *of*'s seems much less likely to be Shakespeare's than to be Ford's.

E.Y. ELLIOTT & ROBERT J. VALENZA, *SHAKESPEARE BY THE NUMBERS* (forthcoming). This book in progress will present our findings, not just on the Earl of Oxford, but on all the other claimants and most of the disputed poems and plays of the Shakespeare Apocrypha and Dubitanda.

55. Elliott & Valenza, *Smoking Guns*, *supra* note 54, at 207-08.



Figure 2.5, comparing all of the Earl of Oxford's poems with all of Shakespeare's poems by grade level, shows a similar result. Oxford's poems are written at the seventh-grade level and fall completely outside Shakespeare's tenth to fourteenth-grade level range.

Figure 2.5. Shakespeare's and the Earl of Oxford's Profiles for Grade Level: 3,000-Word Blocks

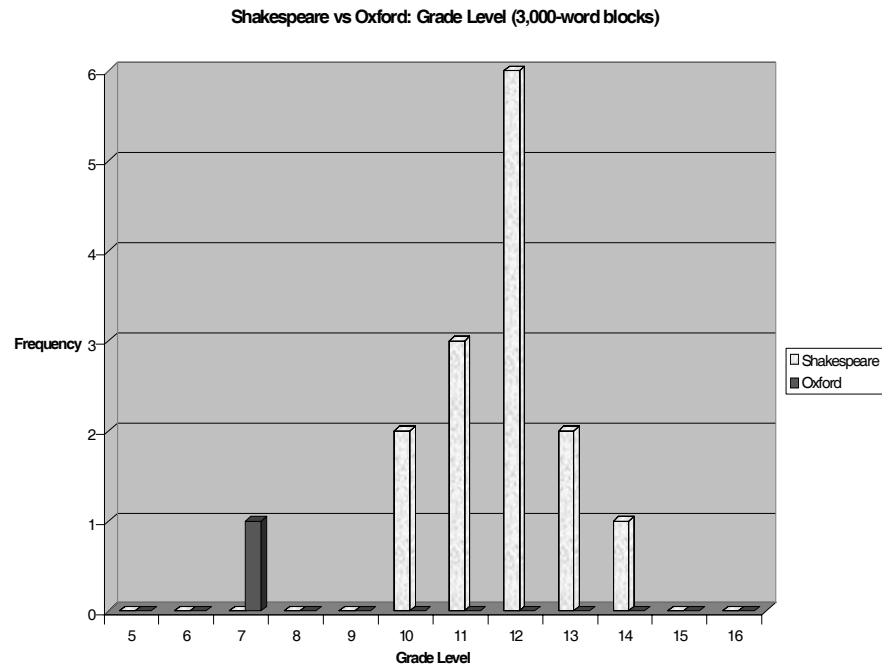


Figure 2.5. Almost half of Shakespeare's fourteen 3,000-word poem blocks were written at the twelfth-grade level (light bars). All of Shakespeare's blocks were written between the tenth- and fourteenth-grade levels. The blocks show a standard deviation of about one grade level with no block more distant than two standard deviations from Shakespeare's mean grade level. Oxford's poems (dark bars) test at the seventh-grade level, five grades and five standard deviations below Shakespeare's mean.<sup>56</sup>

What are the odds that poems like Oxford's, which are five standard

56. Comparisons given here are between the original-punctuation Oxford poems, see May, *supra* note 9, and the modernized *Riverside*, *supra* note 2, used in our baseline. If we had compared with original-punctuation Shakespeare, whose grade-level scores are, on average, a grade higher than the *Riverside*, the Shakespeare baseline curve would have moved one grade level to the right, and the differences from Oxford would have been even more striking.

deviations removed from Shakespeare's mean grade level, could have been so by chance? Before 2003 we classified each test as simply either a Shakespeare rejection or non-rejection and then aggregated and counted all of the rejections. We supposed, roughly but plausibly, that a poem block like Oxford's with six or seven Shakespeare rejections is much less likely to be Shakespeare's than one with only a single rejection. Since then we have worked out two new methodologies, one called "Discrete," the other "Continuous." Together, they have added a new layer of precision to our analysis.

#### *F. Discrete Analysis*

"Discrete" is Elliott's favorite. "Discrete Composite Probability," a variant of simple, discrete rejection counts, involves setting up Shakespeare profiles, rejecting anything outside of their boundaries, and then counting the rejections. Our working motto is, "If the shoe don't fit, you must give it a rejection." Because every profile is set to result in a "could-be" for at least 95% of Shakespeare blocks, that is, yield no more than 5% false Shakespeare negatives, the theoretical odds of a given Shakespeare block with one test rejection being a false Shakespeare negative should be less than 5%. The theoretical odds of a Shakespeare block receiving one rejection in fourteen tests, each with 5% false negatives, are much higher, closer to 50%.

On the other hand, many of our tests in practice have far fewer than 5% false Shakespeare negatives and result in a "could-be" for 99-100% of Shakespeare blocks tested. Appendix Six shows that the actual rejection total in 196 separate runs of fourteen individual tests on fourteen 3,000-word Shakespeare poem blocks was only two. In essence, the baseline produces 1% false negatives, not 5%. Also, only 14% of Shakespeare blocks had one rejection in fourteen tests, not 50%. None of these Shakespeare blocks had more than one rejection on individual tests (marked in aqua in Appendix Six). None had a composite rejection, which would have been highlighted in red or gray in the yellow composite-score columns. The same process on eighty-two 3,000-word blocks of Shakespeare play verse produced a 3% rejection rate on individual tests, with 5% of the blocks receiving false-negative composite rejections.<sup>57</sup>

The same process, as applied to others' poems and play verse, in 3,000-

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57. See Appendix Six: Shakespeare Play Verse Baseline Data, Blocksize = 3,000. In eighty-two 3,000-word blocks of Shakespeare play verse, we found thirty-five Shakespeare rejections in 1,150 separate test runs, a 3% false-negative rate. With individual tests at a 3% false-negative rate, the theoretical odds of getting more than one rejection in the thirteen or fifteen tests we used are 6-7%. Four blocks, 5% of blocks tested, had actual occurrences of more than one rejection. Although we rejected slightly fewer blocks than expected, two blocks had an unexpectedly high number of rejections, three and four. All four blocks are red-shaded as composite rejections.

word blocks, yields much higher rejection rates for individual tests (shaded in aqua): 34% for others' poems<sup>58</sup> and 30% for others' play verse.<sup>59</sup> Only four of ninety-six Shakespeare poem and play verse blocks display a darker-shaded composite rejection (gray or red) for having more than one individual rejection (aqua); the baseline contains 4% false Shakespeare negatives. Only three of the others' poem and play verse blocks received as *few* as one rejection (also gray or red).

Note that darker shading does not mean "rejection" but something more akin to "anomalous outlier." For our Shakespeare baseline, *rejections* are anomalous false negatives and get shaded. For everything else, including dubitanda, *non-rejections* are anomalous false positives and get shaded. Hence, the total of composite anomalies for our 3,000-word Shakespeare poem and play verse baseline is 4%—four dark-spot false negatives in ninety-six blocks. For all such verse by others, we get 2% anomalies—three dark-spot false positives in 125 blocks. For counting rejections, the dark spots are gray, not red, to avoid two kinds of confusion. First, we do not want to double-count with Discrete Composite Probability, which is nothing but a better variant of the same test. Second, we want to avoid the inviting, but not quite accurate, notion that the odds of getting two rejections from twelve tests are the same as getting two rejections from fourteen tests. The odds are actually a little lower. The individual test rejection odds are the same, and the gray shading serves as a reminder that because there are fewer tests, there are fewer opportunities to get a rejection.

We get from the "Discrete Rejections" column to the "Discrete Composite Probability" column of Appendix Six by starting with a blanket average individual-test rejection rate of 2.6% for all of Shakespeare's verse blocks of 3,000 and 1,500 words (the actual rejection rates are 2.7% and 2.4%, respectively). Assuming that rejections occur randomly at a fixed rate, one can calculate the precise rejection odds from a given number of tests at the given average rejection rate. The precise rejection odds are the numbers in the composite column, "Discrete Composite Probability." To simplify the process, we have prepared a user-adaptable spreadsheet, available from us upon request.<sup>60</sup>

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58. *See id.*

59. *See id.*

60. Most of our readers, we surmise, will be horrified to find that all of the composite figures, except raw rejections, are in scientific notation. We use scientific notation, not just because Valenza likes it that way, but because Elliott, the more math-challenged of the two authors, has finally admitted that, whenever you are dealing with lots of zeroes, it is much neater, less confusing, and easier on copy editors to use scientific notation than to try to count out all those zeroes, one by one, with the point of a pencil and your lips moving. Our rule of thumb for math-challenged readers is the following: a number in scientific notation, for example 3 times  $10^{-14}$ , can be written as a decimal point, thirteen zeroes, and then the three or .00000000000003. To use scientific notation on a \$14.95 entry-level scientific calculator, do the following: (1) enter the number; (2) enter the exponent with the EE key, which results in

### G. Continuous Analysis

The other composite odds method, "Continuous," is Valenza's favorite. The Continuous method uses aggregated *distances* from Shakespeare's means as opposed to the Discrete method which uses profile boundaries. This method (1) aggregates every Shakespeare mean on every test into a multi-dimensional composite mean; (2) then measures a given text block's distance, in standard deviations, from Shakespeare's mean on every test; and (3) then aggregates the "Shakespeare distance" on every test into a "Continuous Composite Error" ("CCE") score. A high CCE score indicates that the composite distance from Shakespeare is great. A low CCE score indicates that it is small. A "Continuous Composite Probability" ("CCP") score is calculated from CCE scores. The higher the CCE, the lower the CCP. The CCP of a sample play or poem block, though not useful as an absolute indicator of the odds that Shakespeare wrote the block, can nonetheless be compared to the CCP of a Shakespeare far outlier. Such comparisons can be very telling. Appendices One through Seven provide a complete list of CCPs calculated for every Shakespeare baseline and comparison play, and for selected 3,000-word and 1,500-word poem and play verse blocks by Shakespeare and others.

The virtue of Continuous analysis, with one sizeable exception, is that it does not throw information out. The sizeable exception is that Continuous does not account for time periods for traits like line endings, where Shakespeare's style changed over the years. Discrete analysis distinguishes between early and late profiles; Continuous does not. In general, Continuous measures not only *whether* a sample text falls inside or outside a given Shakespeare range, but also *how far* it falls from the sample's composite mean. In principle, Continuous should outperform Discrete at describing and predicting Shakespeare's patterns in the same way one forecaster with the full resources of the National Weather Service should outperform one with nothing but a K-Mart home weather station. Moreover, unlike Discrete, Continuous is in no way dependent on human judgment for making boundaries. In the Oxford versus Shakespeare grade-level example in Figure 2.5, Oxford receives a Discrete rejection for being over two standard deviations of distance from Shakespeare's mean. Oxford's poems, however, are actually five standard deviations from Shakespeare's mean—or six, if the comparison were to Shakespeare in original punctuation. *A Funeral Elegy*, written at the twenty-

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something like  $3 \times 10^{14}$ , or 3E14 as Valenza puts it; (3) press the +/- key to change the exponent from positive to negative; (4)  $3 \times 10^{14}$  becomes  $3 \times 10^{-14}$ ; and (5) now you are ready to start your calculation. Press INV and EE buttons to reconvert from scientific to normal notation and to return to the tedious and often inaccurate struggle to count those otherwise gratifyingly long strings of zeroes. Scientific notation makes it easier, with minimal preparation, to skim through our columns of rejection odds without stopping to count zeroes. You can recognize immediately which ones are the easy rejection calls, the ones with probabilities of any number times  $10^{-3}$  (that is, E-03) or lower. The ones that say E-01 or E-02 are not. The exponent is usually much more important for such quick scanning than the number it modifies.

second-grade level, is ten standard deviations from Shakespeare in grade-level scores—or nine, if we compared it to original-punctuation Shakespeare. These scores are not just out of the Shakespeare ballpark; in terms of the probability that Shakespeare wrote works at these grade levels, they are in a different state or on a different continent. Continuous scoring, with room to spare, takes account of such differences between gross and narrow rejections as well as the differences between narrow non-rejections and “firm” ones.<sup>61</sup>

It is important to stress again that composite probability scores, whether from Discrete or Continuous analysis, are not indicators of the absolute, actual probability that Shakespeare wrote the block in question. Composite probability scores are markers from which composite Shakespeare ranges are derived. The scores permit *comparison* of the block in question, not with the closest theoretically imaginable Shakespeare match, but with an actual Shakespeare block at the edge of his range.

A handy, comfortably geocentric way to visualize the idea of comparative probability distance is to start with a ballpark and work out.<sup>62</sup> All of Shakespeare’s core-baseline 3,000-word poem blocks and plays, and 95% of his 3,000-word play verse blocks, would fit into the ballpark, most of them in the infield. Ninety-five to ninety-eight percent of shorter Shakespeare verse blocks would also fit into the ballpark, most of them in the infield. For every order of magnitude difference from Shakespeare’s profile-boundary block for poems or play verse, the Shakespeare distance would increase a notch: ballpark, city, county, state, country, continent, planet, moon, outer planets, solar system, galaxy, and another galaxy. If our tests are reliable, anything

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61. The Continuous method also registers “hyper-rejections” in ways that counting Discrete rejections misses. For example, in Figure 2.4 above, what if *A Funeral Elegy* had had 230 *of*s, instead of its actual 145, twice Shakespeare’s maximum, but only 5% over Ford’s? Unadjusted, mechanical rejection counting would register it as both a Ford and a Shakespeare rejection, spuriously evening the rejection score at one-one. The Discrete method misses the crucial fact that the already gross rejection for Shakespeare is even grosser, while the rejection for Ford is narrow.

For both the Discrete and Continuous tests, we compute composite threshold probabilities that a given block could be Shakespeare’s (Appendices One through Nine), for example Shakespeare’s 3.1 E-01 Discrete Composite Probability in Table 2.4. Such “boundary block” thresholds help us to divide Shakespeare from non-Shakespeare. Other things equal, when a text sample of unknown authorship scores appreciably below Shakespeare’s boundary composite probability threshold, our best guess is that it is not Shakespeare’s. The bigger the difference the better the guess. Thresholds also furnish a basis for a figure of merit reflecting on how well our tests separate Shakespeare from others for known samples. See Table 2.5. When we declare that our tests have a perfect score (100%) in net discrimination, we mean that the chosen threshold separates known Shakespeare from known non-Shakespeare perfectly, with no false negatives or false positives. If the discrimination figure was zero, as it probably would be for very short samples, it would mean that our outcomes are no better than random guesses.

62. Valenza would have used a multi-dimensional, sun-centered solar system to illustrate this point.

inside the ballpark would be a Shakespeare could-be. Anything within the city limits would get a relatively narrow, tentative rejection because our tests can vary somewhat in reliability and because we know that up to 5% of our core Shakespeare baseline blocks are false negatives which fall outside the ballpark but still inside the city. For each extra notch of distance past the city limits, the rejection's narrowness and the tentativeness are drastically reduced, and the composite probabilities eventually fall so low that no amount of tinkering or rationalization can avoid the conclusion that Shakespeare did not author the tested block.

#### *H. Some Examples*

To recapitulate, illustrate, and complete this process, we now turn to something we hope will be more accessible than the comprehensive, jam-packed, high-resolution, small-printed, scientifically-notated, Valenza-grade tables provided in the Appendices. These Appendices are appropriately designed to present as much interrelated information as we can squeeze onto a page and to allow an interested mathematician to follow our every step. Passing muster with mathematicians is the bedrock of our case, and our substantial Appendices reflect it. On the other hand, digestibility for a not-so-mathematical audience remains a high priority for us because we expect these to be ninety-nine percent of our readers. For these, we now offer a less tightly packed series of examples with fewer decimal places, larger type, and less fumbling to consult the Appendices.

Table 2.2 is a cut-down, large-type, Elliott-grade version of Appendix Six: Shakespeare Poems Baseline Data, Blocksize = 3,000. Much of the information found in Appendix Six is omitted, and this table shows only six of the fourteen tests we used and only six of the fourteen 3,000-word Shakespeare blocks we tested. But the visual impression is the same as in Appendix Six. This table includes a great deal of white space for non-rejections and only one dark space for a rejection, a fit portrayal of Shakespeare's 1% individual rejection rate in this category.

Table 2.2. Seven Tests on Six 3,000-Word Shakespeare Poem Blocks

Grade Level	HCW /20K	Fem. Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)
10-14	31-153	7-25	9-57	27-89	265-476	4-36
14	98	12	19	77	334	15
13	68	8	15	61	367	22
13	88	3	18	43	316	7
12	50	8	15	48	321	7
12	56	12	19	87	360	7
12	104	7	17	81	476	12

Table 2.2. Highlights of Appendix Six: Shakespeare Poems Baseline Data, Blocksize = 3,000 with a 1% rejection rate (one example shaded here).

Table 2.3 shows the same seven tests on four blocks by Oxford, Bacon, Marlowe, and *A Funeral Elegy*. Many more dark spots meet the eye.

Table 2.3. Seven Tests on Five  $\leq 3,000$ -Word Non-Shakespeare Poem Blocks

Author, Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)
Sh. Range	10-14	31-153	7-25	9-57	27-89	265-486	4-36
Oxford	7	32	0	7	13	115	5
Bacon	12	21	2	6	18	149	11
Marlowe 1	9	42	8	18	51	298	16
Marlowe 2	9	13	9	19	30	206	7
Elegy	22	101	12	46	24	211	8

Table 2.3. Highlights of Appendix Six: Other Poets Versus Shakespeare Baseline, Blocksize = 3,000 with a 35% rejection rate (examples shaded).

Table 2.4. Shakespeare's Farthest Outlier 3,000-Word Poem Blocks Compared with Oxford, Marlowe, and *A Funeral Elegy*

Author	Tests	Rejections	Discrete Composite Probability	Continuous Composite Probability
Shakespeare	14	1	3.1E-01	9.0E-02
Oxford	14	6	7.7E-07	<1.0E-15
Bacon	14	7	2.3E-08	<1.0E-15
Marlowe 1	14	3	5.2E-03	1.6E-02
Marlowe 2	14	4	3.7E-04	3.1E-04
Elegy	14	6	7.7E-07	<1.0E-15

Table 2.4. Blocks from the three leading claimants and *A Funeral Elegy* are all far less likely than Shakespeare's own farthest outlier blocks to have come from Shakespeare by chance. Shakespeare authorship of the closest block, Marlowe One, is five to sixty times less probable than Shakespeare's own outliers. Shakespeare authorship of the most distant block, Bacon, is between 13 million and 90 trillion times less probable than Shakespeare's own outliers.

Table 2.4, adapted from Appendix Six, identifies Shakespeare's outlier blocks on both Discrete and Continuous composite testing. For Discrete, the outlier is the first block of *Venus and Adonis*, with a rounded score of 3.1E-01=.31. For Composite, it is the second block of *Venus and Adonis* with a rounded score of 9.0E-02=.09. The closest other block in the table is Marlowe One, which is between five and sixty times less probable than either Shakespeare outlier by rounded calculation.<sup>63</sup> Marlowe One is not very close to Shakespeare—maybe in the same city or county, but this block is much closer to Shakespeare than Oxford's or Bacon's poems or *A Funeral Elegy*. These three are not even in the same galaxy.

In passing, it is important to note that although one Marlowe block is much closer to Shakespeare than Bacon or Oxford, Marlowe is not a credible Shakespeare match. Marlowe One is in the same city or county with Shakespeare, not the same ballpark; Marlowe Two is in the same county or state. The closest of seven Marlowe plays might be on the same continent or

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63. That is, Discrete composite testing yields the following result: 3.1E-01 divided by 5.2E-03=5.96E01, or 59.6 times less probable. For Continuous composite testing, the result is 9.0E-02 divided by 1.6E-02=5.62E00, or 5.62 times less probable.



planet; the other six are in different galaxies, some too distant to compute.<sup>64</sup> Taken individually, most of Marlowe's works are indeed very distant from Shakespeare. When Marlowe's works are taken as a group, however, the odds that Shakespeare could have strayed by chance so persistently and so extravagantly far from his customary boundaries are far lower than the odds of getting hit by lightning or winning the Irish Sweepstakes. Fortunately, we have more than 100,000 words of Marlowe's writing to compare with Shakespeare. The law of large numbers kicks in much more conclusively for him than for Oxford or Bacon, who each have about 3,000 words of poems to test. It buries Marlowe's claim in an ocean of rejections, and despite his having one arguable near-miss, leaves him on a more distant galaxy than Oxford or Bacon.

We are aware that stylometry itself is a novel, ill-mapped field where all the explorers are on the steep part of the learning curve. Not everyone gets it right on the first or even the tenth try, and many extravagant claims of certitude have been made by others who later came to grief. We are also aware that our target audience of Shakespeare lovers has more than its share of numbers-skeptics. Although our latest odds-calculators are new and have not been extensively reviewed, they seem to promise many zeros worth of extra certitude. These facts seem like fuel for a bonfire of skepticism. Will our claims also come to grief? We doubt it because our findings are much better validated than most. Nevertheless, the situation calls for some further words regarding the strengths and weaknesses of our composite odds-making.

### *I. Strengths and Weaknesses of Discrete Analysis*

The good thing about simply counting rejections is that the process is simple and the results are easy to understand, compute, and present. The information can be easily organized on one page and contains no decimals or scientific notation, yet it gives a clear, usable first impression as to what could be Shakespeare's—plays with one or two rejections—and what could not—plays with ten or twenty-six rejections. The results even hint that the plays with twenty-six rejections are less likely Shakespeare's than the ones with ten rejections. Unfortunately, the downside to counting rejections is that it only gives one the crudest of notions of the odds of Shakespeare authorship, and it allows little variance for the number of tests applied.

On the other hand, the upside to calculating Discrete Composite Probability is that it is a simple, logical supplement to rejection counting. By having both rejection counts and average Shakespeare rejection rates, one can make certain plausible and simplifying assumptions and calculate the mathematical likelihood of getting the observed count from a block of a given size. After making the proper allowance for number of tests, this figure is then

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64. See Appendix One (Claimants); Appendix Two: Claimants Versus Shakespeare's Baseline, Three-Round Composite Scores.

compared to that of Shakespeare's boundary-block threshold. Mathematical likelihood by itself may be nothing but an abstraction, but *comparative* mathematical likelihood is not an abstraction at all. It is real, subject to validation, and highly meaningful. This process adds only one column to the page and does not require massive recomputation. On the other hand, this new column is correspondingly harder to follow than the old because it has more information, signaled by more decimal places and scientific notation. Moreover, like rejection counting itself, the process is all boundaries and no distances. It is chunky and stepwise, and it discards or ignores a great deal of interesting information.

#### *J. Strengths and Weaknesses of Continuous Analysis*

The strength of Continuous Composite Probability is that it is bountifully information-rich. It ignores nothing (except dates and boundaries), focuses all of its attention on measuring and aggregating distances, and measures and compares all test results more fully and precisely than either of the other two methods. But because it is bountifully information-rich, it adds two additional columns of data, which make comprehension more difficult. Worst of all (or is it best of all?) to minimize human error, Discrete requires a massive, complicated, interdependent apparatus of cross-computation and a network of automated rejection markers. Together, these refinements push size and complexity to the outer limits of what can be done with a spreadsheet, making tampering with it exceedingly difficult and risky. These factors limit, to some extent, our ability to add navigation aids, and they stringently limit our ability to change ranges or add new or corrected data. For practical purposes, after ten years of endless tinkering, the tinkering is over. Appendices One through Six are now cast in concrete.

The good thing about using both Discrete and Continuous analysis is that, though they have different starting points and travel very different analytical paths, one much more reliant on human judgment than the other, they are remarkably, reassuringly convergent at the bottom line—especially with passages of 1,500 words or more—and remarkably, reassuringly consistent with each other, and with available external evidence, as to what is Shakespeare's and what is not.

#### *K. Accuracy in Distinguishing Shakespeare from Non-Shakespeare*

How good are the results? More important than the theoretical and presentational strengths and weaknesses of the two new methods is their ability to correctly distinguish Shakespeare from non-Shakespeare. Table 2.5 gives an overview of each test's accuracy, validated for 96-167 blocks of Shakespeare and 70-125 blocks by others.

Table 2.5. Discrimination Accuracy of Discrete and Continuous Testing

Text	Shakespeare		Other		Shakespeare/Other Net Discrimination	
	Discrete	Continuous	Discrete	Continuous	Discrete	Continuous
Full-length						
Plays	100	100	100	100	100	100
Poems 3,000	100	100	100	100	100	100
Poems 1,500	100	98	100	96	100	94
Poems 750	93	98	71	68	64	66
Poems 470	92	75	73	75	65	48
Play Verse						
3,000	95	84	100	100	95	84
Play Verse						
1,500	96	76	88	98	84	74
Play Verse						
750	97	89	75	66	72	55

Table 2.5. “Net discrimination” is 100% minus total errors, that is, 100% minus the sum of false negatives for Shakespeare (=3% for Play Verse 750, Discrete) and false positives for other authors (=25% for Play Verse 750, Discrete) equals 72%. A higher number indicates a greater degree of accuracy. Both Discrete and Continuous testing have high net discrimination for whole plays and verse blocks over 1,500 words but much lower net discrimination for blocks less than 1,000 words.

Table 2.5 shows what looks like perfect net discrimination for whole plays and excellent, but not perfect, discrimination for 3,000-word blocks. The computer is right at least 95% of the time. But “perfect” and “near-perfect” may not be quite the right words to describe this discrimination accuracy when we are dealing with only a limited number of blocks and when, unlike our experience with full plays, there are a few close calls and false negatives. Generally, if a sample block comes in above our threshold, the odds strongly favor the proposition that it is Shakespeare, but we cannot rule out exceptions to this rule. It hardly seems likely that, if someone submitted a 3,000-word block from Joseph Kesselring’s *Arsenic and Old Lace*, and it tested inside our Shakespeare ballpark, we would conclude that it had to be Shakespeare. Solid negative external evidence rules it out. On the other hand, if it tested on a different planet, we would probably and properly conclude that it was *not* Shakespeare. What if it were a block from *The Wisdom of Doctor Dodypoll*, written by an anonymous author in 1600? Scoring inside our Shakespeare ballpark would still make it no more than a Shakespeare could-be, though it would probably send us scurrying to take a closer look at the play. We would not scurry quite so fast if it did not sound like Shakespeare, and we would not scurry at all if it scored on a different planet from Shakespeare.

Table 2.5 also clearly shows that our accuracy diminishes as the blocks get shorter. For blocks of 750 words or less, the computer is right no more than

two times out of three. This result may be better than chance and may be better than nothing. But is it better than pure, aggregated intuition? Although we have found some evidence that a class of Claremont McKenna College undergraduates can get it right almost nine times out of ten with 150-word passages, we will not know until we do more work on aggregated intuition. But on present evidence, we doubt it.

#### *L. Factors That Affect Accuracy*

The following are five standard warnings for people who use our tests: (1) our tests work better on long texts; (2) they work better on poems than plays; (3) they work much better on single-authored than on co-authored texts; (4) they can be thrown off by confounding factors such as editors, time of composition, genre, and prosody; and (5) they are novel. The first two warnings, especially the first, should be clear from Table 2.5. The third warning is one part common sense, as discussed in our description of clean baselines,<sup>65</sup> and one part observation of the Dubitanda section of Appendix One (Apocrypha): Shakespeare Dubitanda and Apocrypha Play Discrimination Summaries. Without exception, and unsurprisingly, whole plays conventionally deemed co-authored—*Henry VIII*, *Pericles*, *Timon of Athens*, *Two Noble Kinsmen*, *Titus Andronicus*, *Sir Thomas More*, and much of the *Henry VI* series—and the parts of these plays not assigned to Shakespeare test outside of Shakespeare's ballpark or worse.

More surprisingly, the parts of these co-authored plays that *are* assigned to Shakespeare also test outside the ballpark, although generally much closer than the supposed non-Shakespeare. Are our tests oversensitive to even a trace of non-Shakespeare? Or are the conventional assignments wrong? We could not say for sure in 1994 when we first encountered this problem, and we cannot say for sure now. But we can say that we are now more willing to entertain the possibility that the conventional assignments are wrong for two reasons. First, our methods, highly novel and untested by outside challenges in 1994, are not nearly so novel now. Because they have been on the market for ten years and they have survived many heavy-looking challenges unscathed, their accuracy on single-authored texts is much more validated. Second, a number of contemporary Hollywood screenwriters, who are in approximately the same business now as Shakespeare was then, are uniformly skeptical that Shakespeare and his co-authors neatly divided their writing scene by scene to make it easier for latter-day stylometrists to decipher who wrote what.

We shall consider our fourth warning—some of our tests can be sensitive to time, editors, genre, prosody, and so on—in greater detail when we examine the Oxford claim in Part III. For now, let us consider our least expected and most problematic result: Continuous Composite Testing puts *Henry V* in a

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65. See *supra* Part II.B.

different galaxy from baseline Shakespeare while Discrete Composite Testing puts it in the same ballpark.<sup>66</sup> Although there is some recent opinion that the verse passages of *Henry V* differ from the rest of Shakespeare,<sup>67</sup> we, like most people, would guess that Shakespeare wrote it, especially given its in-the-ballpark score by Discrete. However, Continuous caught two gross anomalies in *Henry V* that Discrete missed: (1) its superabundance of words new to Shakespeare and (2) words ending in *-ish*.

Neither of these anomalies should be particularly surprising for those who know *Henry V* “by the numbers.” Normally, having too many Shakespeare-new words is a sign that the play was co-authored. In *Henry V* this phenomenon is easily explained by the fact that large portions of it (unlike any other Shakespeare play) are in French. Such words are indeed new to Shakespeare, and counting new words makes *Henry V* stand out, with 42% more new words than the runner-up, *The Merry Wives of Windsor*. Also, *Henry V* is about a war between the French and the English; hence, the word “English” appears three or four times more frequently than it does in the runner-up, *King John*, which explains the superabundance of words ending in *-ish*. Continuous analysis caught and fully counted these two giant, aberrant spikes and correctly identified *Henry V* as a gross Shakespeare outlier. Discrete filtered out the full dimension of the spikes, missed the gross anomalies by light years, and, perhaps by happy accident, correctly identified *Henry V* as a Shakespeare could-be. Was this just an accident? Is there something to be said for having test regimes with clipping filters similar to those found on amplifiers to avoid circuit damage from information overload? We do not know. We would want to know both kinds of results, and we would certainly want our readers to know both kinds of results.

It is useful to recall that most statistical tests do not actually measure whether something was written by Shakespeare, but only whether and how much they depart from Shakespeare’s norms. It is helpful to keep these limits in mind when considering whether to use statistical tests because, despite their imperfections, they may be a better guide than other alternatives. For actually determining whether a text block was written by Shakespeare, our tests so far appear to be 100% accurate for whole, single-authored plays and very accurate for a limited selection of 3,000-word verse blocks. But we consider them less conclusive as the blocks get smaller and more variable or where other confounding factors, such as co-authorship, are present.

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66. For *Henry V*’s vanishingly low Continuous composite probability scores, see Appendix One (Apocrypha): Shakespeare Dubitanda and Apocrypha Play Discrimination Summaries and Appendix Two: Dubitanda and Set-asides, Apocrypha Plays Versus Shakespeare Baseline: Three-Round Composite Scores.

67. See Merriam, *supra* note 31, at 270.

*M. Five Tests of Validity*

In keeping with the *Daubert* rules,<sup>68</sup> we recommend five questions to ask in evaluating our claims.

1. Do our assumptions make sense? Is a clean baseline preferable to a dirty one? Is negative evidence stronger than positive? Is blocking and profiling a reasonable way to find Shakespeare's customary norms? Does it make sense to compute comparative odds of departure from norms? All of these assumptions seem plausible to us.
2. Do our findings square with the facts? This answer depends heavily on what the facts are, which in turn depends heavily on whose ox is gored. We believe that there are no glaring clashes between our findings and what is suggested by generally accepted documentary evidence. For example, we have not found that *Hamlet* or the sonnets must have been written by someone other than Shakespeare, or that Christopher Marlowe's *Hero and Leander* or Edmund Spenser's *Amoretti* are Shakespeare could-be's. Our closest brush with an outright clash with reality was the massive but discounted "rejection" of *Henry V* discussed above. The next closest clash might be our finding that *A Lover's Complaint* tests well outside Shakespeare's profile and is probably not his. This finding is at odds with the prevailing scholarly consensus. The prevailing scholarly consensus overturned the previous consensus that *A Lover's Complaint* was not Shakespeare's.<sup>69</sup> On the other hand, scholarly opinion on *A Lover's Complaint* has always been divided, suggesting that it is one of many areas where neither the external evidence nor the internal evidence has been considered conclusive. Our numbers show that the older consensus was closer to the truth; indeed, if there is a broad-brush summary of our findings, it is that the consensus on authorship in Chambers's time had it about right.
3. Are our tests replicable? Thirty-five out of the fifty-one tests we used are machine tests. With the same inputs they should be perfectly replicable. Fourteen tests, for example, counting hyphens, are manual but are simple, fast, and easily replicable with the same inputs.<sup>70</sup> Two of the tests, enclitic

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68. See *supra* notes 13-15 and accompanying text.

69. See MACD. P. JACKSON, *SHAKESPEARE'S A LOVER'S COMPLAINT: ITS DATE AND AUTHENTICITY* (1965); KENNETH MUIR, *SHAKESPEARE THE PROFESSIONAL AND RELATED STUDIES* (1973).

70. What if the inputs are different? It could make some difference with four of our tests. We have a long list of caveats and discounts for tests like hyphens, which can vary as much by editor as by author. Four of our tests out of fifty-three (8%) are sensitive to editors and are so marked in our Appendix Keys. These four tests are grade level, open lines, hyphenated compound words, and whereas/whenas. Such variances are not a great problem when, as with anything in the *Riverside*, comparisons are made within a large corpus with the same editors. Where different editors are involved, there are a number of ways to correct for this problem at

and proclitic microphrases, are slow and judgmental and may be only 90-95% replicable, but they have very high powers of discrimination. To maximize replicability, we use them sparingly and, wherever possible, with strong controls.

A different way of looking at replicability might be to ask, “Replicable compared to what?” Compared to MacDonald Jackson and Brian Vickers, two of the greatest masters of authorship studies, our replicability is higher because our evidence and findings are much less dependent on the astonishing feats of learning and qualitative judgment, which is their trademark. Our evidence is more homely, more quantitative, cut-and-dried, and hence, much simpler for ordinary mortals who are *not* the greatest of masters, to follow and retrace step by step. Stated differently, it is not hard to imagine that anyone else who had our texts and tools could come up with results very much like ours, and test any of our propositions empirically with enough precision to bet for or against them and know for sure who won or lost the bet. But it is hard to imagine anyone but Vickers writing a book like *‘Counterfeiting’ Shakespeare* or anyone but Jackson writing a book like *Defining Shakespeare*, or anyone challenging their conclusions in a way that could be settled easily or objectively with a bet.<sup>71</sup> If we have problems of replicability, they are practical ones having to do with aging software, platforms, and texts that are not freely available, not ones involving the intrinsic reproducibility of our methods.<sup>72</sup>

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retail as illustrated in our discussion of the Oxford claim in Part III. It is correctable wholesale, if at all, only by a complete re-editing of the millions of words of text in the comparison archive, a process too ambitious and hazardous for us to contemplate. Donald Foster, for example, re-punctuated *A Funeral Elegy* to increase its average sentence length by 44%, and then he concluded that its resulting long sentences were strong evidence that Shakespeare must have written it. See FOSTER, *ELEGY BY W.S.*, *supra* note 40, at 24-67. We believe that the hazards of such practices far outweigh the benefits.

71. See JACKSON, *supra* note 37; VICKERS, *supra* note 41.

72. When we started this project, the default desktop was the then-new DOS PC. The default “minicomputer” for serious crunching was the VAX, then at the peak of its power and popularity. The then-new e-text *Riverside*, readable only with a program called Wordcruncher, was the only available complete Shakespeare on disk. Elliott had just celebrated his fiftieth birthday. Now, DOS is passé, and so are many of the programs that we ran on it. VAX computers will soon be museum pieces. When they go, will they leave Intellex, one of our two signature analytical programs, without a platform? Wordcruncher is in abeyance right now, and with it easy public access to the electronic *Riverside*. And Elliott is now sixty-seven; his platform is aging, too. The tools we have used for fifteen years, and have freely offered to share with others, have been fading away faster than most of the members of the computer-shy authorship community have been willing to try them out on their own. All of these developments will create replicability problems not far down the road, so therefore, we desire to publish our results now, despite further tinkering. Almost all of our testing problems are still soluble for now, and whatever replicability problems may arise will have more to do with product cycles and market availability than with their intrinsic reproducibility.

4. Is there a margin of error? Individual test sensitivities, such as discounts for editing, time of composition, or genre, are marked in the keys to the appendices. Seventeen of our fifty-three tests, about a third, have such sensitivities. As far as we can tell, all but perhaps the four editor-sensitive tests discussed previously are not hard to control by comparing likes with likes, and we have done so. Such sensitivities, and possible others that we and our critics have not yet detected, can be important when the composite rejection is narrow. But where there are so many individual rejections that the composite probability is so low that it has to be written in scientific notation (as is true of all our Claimant and Apocrypha plays and maybe 85-95% of our 3,000-word Other Poets' blocks), the composite rejection is so redundantly strong that every conceivably weak individual link could fail and the rejected sample still would not be in the same county with Shakespeare's farthest outlier. Our tests in the aggregate show a great deal of redundancy, and it matters.
5. Have our tests held up under adverse scrutiny? Yes. Over the years, our critics have fallen into two pairs of categories: (1) the favorable and (2) the not-so-favorable. The favorable pair is comprised of people who like our conclusions (such as Don Foster before 1996 and the Oxfordians before 1990) and people who like our methods (such as most of the 30-odd outside scholarly readers of our journal articles). The not-so-favorable pair consists of people who do not like our conclusions (such as Foster and the Oxfordians after our evidence turned against them) and people who do not like our methods (such as literature department numerophobes who think that crunching Shakespeare is as gauche and perverse as drinking from the finger bowl). Foster and the Oxfordians loved our methods when they liked our conclusions, but they attacked us categorically when they did not like them.<sup>73</sup> Fortunately for us, the attacks were ill-substantiated and did no damage to our evidence or our conclusions.<sup>74</sup> For people schooled in the adversary process, this is good

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73. See Foster, *Authorship Clinic*, *supra* note 32; Donald Foster, *Response to Elliot [sic] and Valenza, 'And Then There Were None,'* 30 *COMPUTERS & HUMAN* 247 (1996); W. Ron Hess, *Shakespeare's Dates: Their Effects on Stylistic Analysis*, in 2 *OXFORDIAN* 25 (1999); John Shahan, Letter to the Editor, *Reply to Elliott and Valenza, "Can the Oxford Candidacy be Saved?,"* in 4 *OXFORDIAN* 154 (2001).

74. See Ward E.Y. Elliott & Robert J. Valenza, *Can the Oxford Candidacy Be Saved? A Response to W. Ron Hess, "Shakespeare's Dates: Their Effect on Stylistic Analysis,"* in 3 *OXFORDIAN* 71 (2000) [hereinafter Elliott & Valenza, *Oxford Candidacy*]; Ward E.Y. Elliott & Robert J. Valenza, *Glass Slippers and Seven-League Boots: C-Prompted Doubts About Ascribing A Funeral Elegy and A Lover's Complaint to Shakespeare*, 48 *SHAKESPEARE Q.* 177 (1997) [hereinafter Elliott & Valenza, *Glass Slippers*]; Ward E.Y. Elliott & Robert J. Valenza, *The Professor Doth Protest Too Much, Methinks: Problems with the Foster "Response,"* 32 *COMPUTERS & HUMAN* 425 (1998); Ward E.Y. Elliott & Robert J. Valenza, Letter to the Editor, *Reply to John Shahan*, in 6 *OXFORDIAN* 154 (2003) [hereinafter Elliott & Valenza, *Reply to John Shahan*]; Elliott & Valenza, *Smoking Guns*, *supra* note 54; Elliott & Valenza, *So Many*



news. You do not know how strong your bunker is until someone bombs it. Ours was deluged with bunkerbusters, but the damage was negligible. Either our bunker was strong, or the bombs were duds, or both. The attacks amounted to a series of massive, highly adversarial audits that we passed with flying colors.

6. Are we or our critics willing and able to bet on it? Let us conclude our *Daubert* duties with a thought experiment and an offer. We claim that our tests have been 100% accurate in distinguishing core Shakespeare plays from non-Shakespeare plays. Would we be willing to bet on it? As it happens, this is not just a hypothetical. A Canadian literature department numerophobe and hockey fan proclaimed categorically on Shaksper, the leading Shakespeare news and discussion group,<sup>75</sup> that our statistics, indeed all statistics, are circular and tell you nothing that you do not already know. He announced that although we had admittedly found some tests that could separate a few known Shakespeare plays from a few known plays by others, these results tell us precisely nothing about plays we have not tested.

We thought he was wrong. If the sun rises in the east for eighty days in a row, and not in the west, we would take it as a sign that it would do so on the eighty-first day as well. It did. If the New Jersey Devils played the neutral-zone trap all year in 2003, we would take it as a sign that they would do so likewise in the playoffs. They did. If all twenty-nine of Shakespeare's core plays test inside the ballpark and all fifty-one other authors' plays test outside the solar system, we would take it as a sign that a hypothetical thirtieth pure-Shakespeare play would probably also test inside the Shakespeare ballpark and that a fifty-second play by someone else would probably test outside it. Barring a miraculous discovery of a lost Shakespeare play, the second proposition is much more testable than the first. We thought it was testable enough to bet on it with a strong likelihood of recognizing who won and who lost. We offered our critic a one thousand dollar even-odds bet that our tests would reject any hitherto-untested other-authored play he might choose. He declined, and we believe he was wise to do so.<sup>76</sup>

What would have happened if he had accepted the bet; gone to Literature Online (LION);<sup>77</sup> called up all English plays between 1550 and 1620; cast all

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*Hardballs*, *supra* note 32.

75. SHAKSPER: The Global Electronic Shakespeare Conference, at <http://www.shaksper.net> (last visited Jan. 2, 2005).

76. See Posting of Seán Lawrence, [sklawren@dal.ca](mailto:sklawren@dal.ca), to [editor@shaksper.net](mailto:editor@shaksper.net), at <http://www.shaksper.net/archives/2003/1127.html> (June 6, 2003) (on file with the *Tennessee Law Review*).

77. Literature Online: The Home of Literature and Criticism, at <http://lion.chadwyck.com> (last visited Jan. 2, 2005).

counting and calculation to the winds; simply picked one out on a whim, perhaps *Sir Giles Goosecap: Knight*, written in 1606, anonymous but ascribed by LION and others to George Chapman; and thrown it at our feet like a glove that just might fit? In one sense, this play would be a better-than-average choice because, as far as we know from LION, it is single-authored. Our tests are quick enough to reject even one non-Shakespeare co-author; imagine what they would do with two! But in another sense, it would be a worse-than-average choice because we have already tested two other Chapman plays, *The Gentleman Usher*, written in 1602, and *Bussy d'Ambois*, written in 1607, and both tested in a different galaxy.<sup>78</sup> We have not tested *Sir Giles Goosecap*, or even read it, and it is certainly conceivable that, unlike the seventy-nine other other-authored plays we tested, it would land right inside the ballpark and not outside the Shakespeare solar system. But we would not want to bet on it, and neither, we suspect, would he.

On the other hand, nothing but his professed numerophobic principles requires him to pick at random or on impulse. With one thousand dollars at stake, our critic might swallow his contempt for systematic counting and comparing, return to the LION list, and try to beat us at our own bean-counting, Sabermetric, Moneyball game. He would screen LION systematically, searching for a winner, using the very tests he professes to scorn and which we would happily supply. When we went to LION to consider how big a job this might be, the site listed for us 361 plays performed between 1550 and 1620. Forty-nine of the plays (14%) were multiple-authored and therefore below-average candidates for the same reason that *Sir Giles Goosecap* was an above-average candidate: Multi-authored plays would probably have more Shakespeare-rejectable authorial quirks than single-authored plays.<sup>79</sup>

Of the remaining 312 available single-authored plays, we found that we had already tested eighty of the first, most accessible layer and found none of the other-authored plays on the same planet as any Shakespeare play.<sup>80</sup> We did not test the second layer, the 146 plays like *Sir Giles Goosecap*, because

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78. See Appendix One (Claimants): Claimant Play Discrimination Summaries; Appendix Two: Claimants Versus Shakespeare Baseline, Three-Round Composite Scores.

79. On the other hand, *Sir Thomas More*, thought to be mostly written by Anthony Munday, has thirty lines attributed to Dekker and 148 lines commonly attributed to Shakespeare, yet it has only seven Shakespeare rejections, the same as *Titus Andronicus*, which most people believe was at least co-authored by Shakespeare. But these are only, respectively, about 1% and 6% of the play, and most people besides us think the 6% is Shakespeare. The 1% is probably too small to generate rejections on top of Munday's, and the 6%, if it is Shakespeare's, would tend, if anything, to dilute Munday's rejections, not add to them. Munday's other tested play, *John à Kent and John à Cumber*, generated fourteen rejections.

80. The eighty works tested include twenty-nine core Shakespeare baseline plays and fifty-one identifiable other-authored plays. We did not count nine plays from the Dubitanda, whose results are qualified by varying degrees of co-authorship, nor twenty-seven plays of the Shakespeare Apocrypha, whose results are unequivocal but barely appear on our LION list.

they were believed to be written by authors like Chapman whose other plays or poems had been tested by us and landed outside the solar system. This second layer amounts to half of the single-authored plays in LION, and we suspect that any sensible person looking for a Shakespeare non-rejection would put these plays aside as well. If there is any regularity or consistency to an author's writing habits, and our tests show abundantly that there is, it is not necessary to test all fourteen of Chapman's plays, nor all seventeen of Fletcher's, nor all thirty-eight of Jonson's, to know when you have lost the scent of the True Shakespeare.

That leaves the third layer, the last quarter of LION's single-authored plays, eighty-six plays by forty-six authors we have not tested, such as John Phillips's *Patient Grissel*, George Ruggle's *Ignoramus*, or Nicholas Udall's *Ralph Roister Doister*. Screening eighty-six plays would be time-consuming, even with our wondrous toolbox of fast tests, and we would be surprised if it produced a single play that fit our Shakespeare profile. After all, these plays are the leftovers from our claimant and apocrypha lists, the residue of centuries of scholars picking over the same 300-odd plays to find another play written even partially by Shakespeare. No anti-Stratfordian nor any orthodox scholar searching dusty libraries for lost Shakespeare works could identify in any of them a plausible, marketable resemblance to Shakespeare. Who would want to spend any further time seeking a Shakespeare match in such barren-looking tailings? Certainly not us.

On the other hand, if we could pay *someone else* one thousand dollars to do the necessary, massive, tedious, and unpromising due diligence, we would consider it money well spent. It would validate our tests on the last, least-promising quarter of LION's population of available plays for a tiny fraction of what it had cost us for the first quarter. It could confirm or qualify our confidence in our new techniques, help spread its use to others, and maybe, just maybe, it could turn up that long-overlooked Shakespeare treasure that so many have sought so long in vain. What is not to like? We would be willing to revive our bet offer, donate what is left of our best software, and help with the crunching. We would enjoy the windfall win or lose. Are there any takers?

Just as important as our willingness to bet on the predictive powers of our findings is the fact that our rules are so tight, quantified, and hence, replicable that our prediction would be eminently testable and falsifiable. If anyone takes us up on our bet, with or without screening, it will not be difficult to tell who won or lost. Can this be said of any other composite authorship-identification system now on the market? We would not bet on it.

#### *N. Set-Asides and Latent Variability*

Before taking leave of the original challenge to try to prove that our methods would work on a new, untested Shakespeare or other-authored play, we should mention "set-asides"—the need to compensate for latent variability in small or partial baselines—and how these bear on the robustness of our

findings. What if no one had ever heard of *Hamlet* or *Julius Caesar*, but both were found hidden in the rafters of Shakespeare's house or in the ruins of Oxford's Castle Hedingham? Would our tests recognize them as Shakespeare could-be's? More plausibly, what if, instead of testing all of Shakespeare's plays, we had purposely set these two plays aside from our baseline and followed exactly the same rules with the remaining plays that we did with our actual core baseline? Would they still come out as could-be's?

The answer, with a small safety allowance for the partial baseline, is yes. It is perfectly possible to do this exercise retroactively by examining the Shakespeare baseline scores on each test in Appendices Three to Five and by looking for profile-defining outlier scores. In *Hamlet*'s case, there would be three of these in forty-eight tests: (1) *un-* words, with sixty-five per 20,000; (2) *-ment* words with thirty-six per 20,000; and (3) *very*'s with forty-two per 20,000.<sup>81</sup> The runners-up had, respectively, sixty-four, thirty-five, and forty-one—one less of each across the board.<sup>82</sup> In *Julius Caesar*'s case, there were only seventeen *ex-* words per 20,000; the runner-up had nineteen.<sup>83</sup>

A small safety allowance, such as a 5-10% expansion of the profile range or a loosening of the Discrete Composite rejection threshold, or both, could easily accommodate such small differences and still easily say "could-be" to all known core Shakespeare plays and "couldn't be" to all known, tested non-Shakespeare plays. Such ease of accommodation is due largely to the colossal distance between the nearest of these non-Shakespeare plays and Shakespeare's farthest known core baseline outlier. We have not added such allowances to our Shakespeare ranges, which are already too complex and densely packed for most readers, but we have used them in the past to separate "firm" rejections from "narrow" ones.<sup>84</sup> We would not hesitate to use such allowances in the future, where appropriate.

The partial- or smaller-baseline consideration is of less concern for Shakespeare, whose actual poem baseline is sizeable and whose play baseline is huge, than it is for others such as Marlowe, Chapman, and Ford, whose available baselines are smaller. Accordingly, if the starting baseline is small, the safety allowances for non-inclusion should be large.<sup>85</sup>

In a sense, every other-authored play we have not tested is a kind of set-aside, and it should not be hard to test any one, ten, or all of the 232 or so untested LION plays simply by taking us up on our bet. But is that even necessary? We never planned it that way, but many natural trials of the set-

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81. See Appendix Five: Shakespeare Play Baseline Data, Round Three Tests (*Hamlet*).

82. See *id.*

83. See *id.* (*Julius Caesar*).

84. See Elliott & Valenza, *Smoking Guns*, *supra* note 54, at 210-11 (discussing safety allowances with regard to determining the importance of rejections in tests comparing a small John Ford baseline with a large Shakespeare baseline).

85. See *id.* at 209-11 (explaining the need for more safety allowances when testing smaller baselines).

aside idea have already taken place with smaller blocks. Whenever we extended our testing from a small number of Shakespeare poem blocks to a larger number of Shakespeare play verse blocks, we were testing a very large set-aside. Table 2.1 above hints at the outcome for several block sizes. Except for grade-level, where Shakespeare's use of much shorter sentences for a mass audience is hardly surprising (everyone else who wrote poems and plays did it too), most of the play-block ranges turned out to be all but identical to the poem-block ranges.

Likewise, when Marina Tarlinskaja sent us a bonanza of her enclitic and proclitic counts in 2002, she tripled our holdings of reliably-counted Shakespeare play verse, doubled our holdings of all Shakespeare verse, and led us to enlarge our total Shakespeare play verse baseline from fifty-six 3,000-word blocks to eighty-two, a 46% increase. However, our ranges barely budged. Table 2.6 shows the comparison between the relevant old ranges,<sup>86</sup> before the "set-aside" bonanza, and the new ones in Table 3.1<sup>87</sup> that incorporate the "set-aside" into the new baseline.

Table 2.6. What happened to our ranges when we increased the baseline by 46%?

<i>Test, 3,000-word blocks</i>	<i>Old 2000 range</i>	<i>New 2004 range</i>
Hyphenated Compound Words	31-153	31-153
BoB7	136-944	136-944
Open Lines	7-24	7-24
Feminine Endings	5-23	5-23
Enclitics/1,000 lines	31-87	27-89
Proclitics/1,000 lines	265-476	265-476

Table 2.6. Increasing our Shakespeare verse baseline by 46% made no difference in four of our Oxford-relevant Shakespeare ranges. Doubling our Tarlinskaja-counted Shakespeare verse baseline enlarged our enclitic range by 6%, not enough to make the Earl of Oxford a Shakespeare could-be, and left all other ranges unchanged.

We would assume that our tests that work on 3,000-word blocks are generally more robust than those that only work on whole plays. However, these very high levels of robustness in the small blocks, when tested against large set-asides, are strong indicators that we would find high levels of robustness also in large blocks. Thus, our conclusions are no less reliable because we tested all of Shakespeare's known or suspected plays at once.

86. See Elliott & Valenza, *Oxford Candidacy*, *supra* note 74, at 72 (listing our old ranges).

87. See *infra* Part III.

They are also scarcely less reliable because we tested only a quarter of other works, where the other three-quarters of works are either by people we have already tested and firmly rejected or by authors who have been passed over by generations of scholars desperately seeking Shakespeare.

### III. HOW OUR METHODS APPLY TO THE EARL OF OXFORD<sup>88</sup>

#### *A. Oxford Fails Too Many Tests to Be a Shakespeare Could-Be*

Our methods are strong and predictive enough, for play-length samples, for us to bet a sizeable sum that they will be at least a tenth as good at rejecting the next non-Shakespeare play as they were at rejecting the other seventy-eight plays that we tested. The odds are not always as uniformly overwhelming for 3,000-word verse blocks, like our entire Oxford corpus, or for 1,500-word verse blocks, like the half of the Oxford corpus that is in iambic pentameter. Such blocks require closer attention to the validity of individual tests in a specific retail application, where various discounts for things like time, editorial practice, genre, and prosody can be considered. But still, even after every discount has been applied, the odds that someone of Shakespeare's known writing habits could have written Oxford's poems by chance, or vice versa, are much lower than the odds of getting struck by lightning.

Oxfordians have long argued that Oxford's writing sounded just like Shakespeare. They recall with pleasure the trick that Oxfordian scholar Louis Bénézet, Sr. liked to play on Stratfordian English literature professors in the 1940s. He would give them a seventy-line mixture of passages from Shakespeare and Oxford, defy them to tell one author from the other, find that they had great trouble in doing so, and conclude that his experiment showed that Oxford's style was barely distinguishable from Shakespeare's.<sup>89</sup>

Much has changed since those days. In 1980 Steven May showed from external evidence (and over Charlton Ogburn, Jr.'s objections that "[h]e is unconcerned with stylistic criteria"<sup>90</sup>) that some of the passages Bénézet thought were Oxford's were in fact written by Robert Greene and that five other poems confidently assigned to Oxford by Thomas Looney, and other Oxfordian scholars (following A.B. Grosart), were not Oxford's work.<sup>91</sup> In 1989 the students in the Claremont Shakespeare Clinic found mismatches between Shakespeare and twenty-seven testable poet claimants, including the frontrunners Oxford, Bacon, and Marlowe. Oxford's poems failed five of the six new tests and seemed particularly different from those of Shakespeare. A

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88. The text and footnotes of Part III are largely derived from Elliott & Valenza, *Oxford Candidacy*, *supra* note 74.

89. See OGBURN, *supra* note 2, at 393-97 (reproducing and discussing Bénézet's text).

90. *Id.* at 396.

91. See May, *supra* note 9, at 79-84.

round of “refutations” ensued in Oxfordian publications and in private correspondence with Oxfordians, followed by a long period of silence. Some “refutations” made worthwhile points; others did not. Invitations to respond to these charges in Oxfordian publications or at meetings stopped forthwith for many years. During this time, we made a few revisions in our tests and published our general findings in mainstream journals.<sup>92</sup> We noted that the stylistic trends in Shakespeare’s plays, by conventional dating, might protect Oxford from a Shakespeare rejection for having too few feminine endings or open lines because most of Oxford’s poems were written before Shakespeare’s,<sup>93</sup> but that the trends in Shakespeare, conventionally dated, lasted for years after Oxford’s death.<sup>94</sup> We also noted that if we used Oxfordian dating, all of Shakespeare’s dates would be dated ten or twenty years earlier. In that case, no trends would have outlasted Oxford, but the trends themselves would disappear entirely, leaving Oxford a gross mismatch with Shakespeare.<sup>95</sup> We thought that either interpretation would gravely damage the case for Oxford, although we did not exclude the possibility that Oxfordian dating could “be reshuffled somehow to fit Oxford at both ends.”<sup>96</sup>

Eight years later, Oxfordian Ron Hess finally accepted our challenge and reshuffled Oxford’s dates to maintain the upward stylistic trends until 1604 when Oxford died.<sup>97</sup> *The Oxfordian* invited us to reply, and we did, starting with a table of Oxford’s Shakespeare rejections, updated and reproduced here in Table 3.1.

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92. See Ward E.Y. Elliott & Robert J. Valenza, *A Touchstone for the Bard*, 25 COMPUTERS & HUMAN. 199 (1991) [hereinafter Elliott & Valenza, *A Touchstone for the Bard*]; Ward Elliott & Robert J. Valenza, *Was the Earl of Oxford the True Shakespeare? A Computer-Aided Analysis*, 236 NOTES & QUERIES 501 (1991) [hereinafter Elliott & Valenza, *True Shakespeare*].

93. See Elliott & Valenza, *True Shakespeare*, *supra* note 92, at 503-04.

94. *Id.* at 504.

95. *Id.*

96. *Id.*

97. See Hess, *supra* note 73, at 25-39.

Table 3.1. Oxford's Poems Compared to Shakespeare's  
Most Discrepant Poem Block<sup>98</sup>

Shakespeare Range	Most Discrepant Shakespeare Poem Block	Oxford Poems	Shakespeare Baseline	Remarks
Grade level, 10-14	10	7	A	g, e
HCW/20k, 31-153	153	32	A, B	e
Rel. clauses, 7-17	7	20	A	
BoB7, 136-944	625	1000	A, B	t, s/m
Modal distance, 281-1149	467	2892	A	g
Open lines %, 7-24	8	7	C	t, e, p
Fem. endings %, 5-23	11	0	C	t, p
Enclitics/1,000 ln., 18-143	22	13	C	p
Proclitics/1,000 ln., 235-561	199	115	C	p
Total Shakespeare rejections	1	7	A	
Discrete Comp. Prob. 3000 Sh.: Oxford $\approx$ 400,000 to 1	3.08E-01	7.75E-07	A	
Continuous Comp. Prob. 3000 Sh.: Ox. $\approx$ 150 trillion to 1	1.50E-01	<1E-15	A	

Table 3.1. The Shakespeare Clinic's fifteen authorship tests show strong similarities among ninety-six 3,000-word Shakespeare core verse blocks tested, and strong dissimilarities between Shakespeare's verse and Oxford's. The first 3,000-word block of *Venus and Adonis*, though it least resembles Shakespeare's other poem blocks, has only one Shakespeare rejection in fifteen tests.<sup>99</sup> Oxford's poems have seven rejections in the same fifteen tests (shaded), far more than any Shakespeare block tested. Oxford's poems have many more relative clauses than Shakespeare and far fewer feminine endings, enclitics, and proclitics. His grade-level scores are far below Shakespeare's, his BoB7 scores above Shakespeare's, and his modal distance from Shakespeare's mean is far greater than that of any like-sized Shakespeare block. Note that the four-verse tests (between the thick horizontal lines) are for Oxford's iambic pentameter verse only, which is less than half of his 3,042-word sample. For these verses, the relevant comparison (shown) is to the first 1,500-word block of *Venus and Adonis*. The odds that Shakespeare could have produced Oxford's test patterns by chance are between 400,000 to 1.5 quadrillion times worse than the odds

98. Elliott & Valenza, *Oxford Candidacy*, *supra* note 74, at 72.

99. See Appendix Six: Shakespeare Poems Baseline Data, Blocksize = 3,000 for fourteen of these tests. The fifteenth test is the use of relative clauses, a well-validated test, which, however, is manual and too slow for us to apply wholesale outside of Shakespeare.



for Shakespeare's own most discrepant block. These odds are also worse than the odds of getting hit by lightning.<sup>100</sup>

Key to Table 3.1

HCW: Hyphenated Compound Words per 20,000 words.

Rel. Clauses: Relative clauses per 3,000-word block.

BoB7, Modal distance, open lines, feminine endings, enclitics, and proclitics per 1,000 lines: see text. Relevant Shakespeare ranges are set in bold type and italicized.

Shakespeare Baseline:

- A: Fourteen 3,000-word blocks of Shakespeare's poems; all but *A Lover's Complaint* (Shakespeare authorship doubtful) and *The Phoenix and Turtle* (too short);
- B: Eighty-two 3,000-word blocks of verse from selected Shakespeare plays;
- C: Twenty-eight 1,500-word blocks of Shakespeare's poems, minus *A Lover's Complaint* and *The Phoenix and Turtle*; same as A, but with 1,500-word blocks.

Remarks on Test Sensitivities:

- g: results can be sensitive to differences of *genre* (poem verse v. play verse);
- e: results can be sensitive to differences in *editing*, such as spelling and punctuation;
- p: results can be sensitive to differences in *prosody*, that is, verse structure, meter, stanzaic structure, and rhyme schemes;
- s/m: results can be sensitive to differences in *subject matter*;
- t: results can be sensitive to differences in *time of composition*;

All ranges and results except those in the area between the thick lines are based on comparisons between the entire Oxford poem corpus, per Steven May, and 3,000-word Shakespeare poem and/or play verse blocks. Ranges and results in the area between the thick lines are based on comparisons with 1,500-word Shakespeare poem blocks, and compare *only* the 1,304 words of Oxford's poems that are in iambic pentameter with like-sized iambic pentameter Shakespeare poem blocks. See "Shakespeare Baseline" column, above, for details. Shakespeare's most discrepant poem block, both 3,000-word and 1,500-word, is the first block of *Venus and Adonis*.

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100. These odds do not exactly match those in Appendix Six because we use one more test here; we separate iambic pentameter more explicitly; and we compare Oxford to a single, most-discrepant Shakespeare block under both composite-odds tests, rather than to the two or more most-discrepant blocks under each test separately. Even so, the overall outcomes are similar; the odds of Shakespeare authorship are vanishingly low. In comparison, the odds of one person not just getting hit by lightning, but dying from it, have been reckoned at about 1 in 2.4 million a year, 1 in 32,000 in a seventy-five-year lifetime. See *Heterosexual AIDS Risk Versus Being Struck by Lightning*, at <http://www.righto.com/theories/lightning.html> (last visited Oct. 4, 2004).

*B. Test Specifics*

For Oxford, as for Shakespeare, we followed our standard methodological guidelines—clean baseline, block and profile, and silver-bullet evidence—and used our standard methods for calculating comparative odds for Shakespeare authorship. In Oxford's case we used a clean comparison sample: the poems Steven May assigned conclusively to Oxford in 1980,<sup>101</sup> and not his "possibly Oxford" poems,<sup>102</sup> nor the *A Hundreth Sundrie Flowres* poems claimed for Oxford by some Oxfordians.<sup>103</sup> We compared like-sized Shakespeare blocks with both relevant Oxford blocks—Oxford's whole, 3,042-word corpus with 3,000-word Shakespeare blocks, and Oxford's 1,304-word iambic-pentameter corpus with 1,500-word Shakespeare blocks.

Besides size, we also tried to control for other relevant variables little discussed in our broad-brush, wholesale Part II but pertinent to detailed, retail analysis of whether a given sample, such as Oxford's poems, is a Shakespeare could-be. These variables are the following: genre (whether a work is play verse, prose, or poem), time of composition, subject matter, editorial conventions (spelling and punctuation), and prosody (for example, meter or stanzaic structure).

The most common of these variables are listed in the "Remarks" column of Table 3.1. It is seldom possible to match perfectly all of these at once, but there are often ways to try one combination against the other and see how much difference it makes. In Oxford's case, we have matched our 3,000-word blocks for genre (poem v. poem, or poem v. play verse) and spelling (*Riverside* spelling, including hyphenation) but not for prosody or time of composition where Oxfordians take strenuous issue with orthodox Shakespeare dating. Ninety-nine percent of Shakespeare's verse, but less than half of Oxford's, is iambic pentameter, and most of Oxford's poems far predate Shakespeare's plays, as conventionally dated. For our four verse-tests, which are considered sensitive to prosodic variations (between the thick lines in Table 3.1), we used 1,500-word blocks matched for genre (poem v. poem), spelling, and meter (iambic pentameter v. iambic pentameter) but again, not fully matched for time of composition by conventional reckoning.

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101. See May, *supra* note 9, at 25-42.

102. See *id.* at 79-83.

103. We tested some of the *A Hundreth Sundrie Flowres* "Oxford" poems in 1990 and did not find a Shakespeare match. See Ward E.Y. Elliott & Robert J. Valenza, *And Then There Were None: Winnowing the Shakespeare Claimants*, 30 COMPUTERS & HUMAN. 191, 201-02 (1996) [hereinafter Elliott & Valenza, *There Were None*] (finding too many Oxford and "Meritum Petere Grave" Shakespeare rejections for either to be a credible True Shakespeare); Elliott & Valenza, *True Shakespeare*, *supra* note 92, at 502-04 & n.6 (rejecting both Oxford and "Meritum of Petere Grave" as credible Shakespeare claimants).

## C. Test Outcomes

Our emphasis on silver-bullet, negative evidence means that the eight strong, validated Shakespeare tests that our Oxford poem sample passed<sup>104</sup> are much less interesting than the seven that it failed. The former are nothing more than could-be's. Only the latter (plus hyphenated compound words, a close-call Oxford pass, and open lines, a time-sensitive verse test passed by Oxford's iambic-pentameter poems and not segregated in our earlier work to include iambic pentameter only) are listed in Table 3.1. Table 3.1 compares Oxford's poems with Shakespeare's least typical core poem blocks, the first 1,500 or 3,000 words of *Venus and Adonis*. In all but one case, the most discrepant Shakespeare block fits (sometimes barely) within the Shakespeare profile we used, while in every case but two (hyphenated compound words ("HCW") and open lines), the matched Oxford block does not. Let us look at the Oxford outcomes.

*Grade Level.* Shakespeare's poems have much longer sentences and/or longer words than Oxford's, testing no lower than the tenth-grade level. Oxford's poems test at the seventh-grade level. This test, which compares Oxford's lightly modernized punctuation with that of the *Riverside*, is sensitive to editorial preference, but comparing original-punctuation Oxford with original-punctuation Shakespeare would make the gap a full grade wider (Figure 2.5). It therefore seems to be a clear rejection.

*Hyphenated Compound Words.* Oxford's poems have fewer HCWs per block than any like-sized Shakespeare poem block and fewer HCWs than 97% of Shakespeare's like-sized play verse blocks. But, to be cautious, we re-edited Oxford's poems to mark every arguable *Riverside* hyphenation; we expanded our Shakespeare verse baseline to include plays, as well as poems; and we broadened our Shakespeare profile to include the highest highs and lowest lows found in either genre (Table 2.1).<sup>105</sup> This was just enough to squeeze Oxford's poems into the expanded Shakespeare range and turn a narrow rejection into a narrow pass, though it still hardly makes a close match with Shakespeare.

*Relative Clauses.* In the phrase, "the evil that men do," *that men do* is a relative clause. Oxford's poems have twenty relative clauses, many more than Shakespeare's maximum of seventeen per 3,000-word block. We found this

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104. See Appendix Six: Other Poets Versus Shakespeare Baseline, Blocksize = 3,000; Appendix Seven: Other Poets Versus Shakespeare Baseline, Blocksize = 1,500.

105. After re-editing Oxford's poems to follow spelling conventions found in the *Riverside*, we found five arguable hyphenated compound words—*oft-times*, *late-done*, *good-looking*, *salt-sea*, and *tennis-knit*—well below Shakespeare's minimum eight in fourteen 3,000-word poem blocks. See Elliott & Valenza, *There Were None*, *supra* note 103, at 198, 237. Two of our fifty-five blocks of Shakespeare's play verse (2.9% of our total Shakespeare verse baseline) had as few as four HCWs. The figures given are HCWs per 20,000 words to facilitate comparison with plays. As far as we can tell from the *Riverside*, Shakespeare's hyphenation ranges did not vary much between poems and plays, nor between early and late works.

test useful, but we used it sparingly outside the Shakespeare baseline because it is slow and manual. Here, it produces another clear Oxford rejection.

*BoB7.* This is a ratio of occurrences of the word “is” to occurrences of the contractions *’tis*, *there’s*, *I’m*, *here’s*, *she’s*, *that’s*, and *what’s*. It is validated for the entire range of Shakespeare plays but, because Shakespeare used fewer contractions in his earliest plays, it reasonably could be questioned as applied to works, such as Oxford’s poems, composed *before* the earliest of Shakespeare’s plays, as conventionally dated. In other words, as noted, this test is sensitive to time of composition. However, the Oxfordian re-datings, which backdate Shakespeare’s earliest plays by a decade or more, would make such sensitivity a moot issue.

*Modal Distance.* Modal analysis tests the extent that authors use, or avoid using, certain words together.<sup>106</sup> Our version was sensitive to genre, working well on poem-poem comparisons, like this one, but not so well on play-verse or song-verse comparisons.<sup>107</sup> Shakespeare’s updated modal range for 3,000-word blocks runs from 281 to 1,149. Oxford’s poems received 2,892, almost eight standard deviations removed from Shakespeare’s mean and six beyond Shakespeare’s maximum. By this test, the two authors were on different planets.

*Open lines.* These are lines that do not end with punctuation. They are sensitive to time of composition, editorial practices (punctuation), and prosody. Therefore, one should compare iambic pentameter with iambic pentameter, not with any of the un-Shakespearean meters that characterize most of Oxford’s verse. Hence, all the verse tests in Table 3.1 (between the thick lines) compare *only* Oxford’s iambic pentameter poems, amounting to 1,304 words, and written between 1576 and 1593, with Shakespeare’s iambic pentameter poems, written between 1593 and 1609 by conventional dating, and divided into like-sized 1,500-word blocks.<sup>108</sup> Oxford’s poems barely fit within Shakespeare’s 1,500-word profile, with no effort to allow for strong upward trends in Shakespeare’s play verse, where, by conventional dating, the percentage of open lines quadrupled between 1590 and 1613.<sup>109</sup>

Discounting for trends in open lines in the plays would be necessary under conventional dating because most of Oxford’s poems far predated most of Shakespeare’s plays.<sup>110</sup> But discounting trends in open lines would not be necessary under Oxfordian re-dating of the plays, which makes many of Shakespeare’s plays appear contemporary with Oxford’s poems and makes the

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106. See Elliott & Valenza, *A Touchstone for the Bard*, *supra* note 92, at 201-07 (providing a detailed discussion of modal analysis); Elliott & Valenza, *True Shakespeare*, *supra* note 92, at 502 (discussing modal analysis in general).

107. See Elliott & Valenza, *There Were None*, *supra* note 103, at 196-97 (discussing “Semantic Bucketing”). For our updated modal scores, see Appendix Six: Shakespeare Poem Baseline Data, Blocksize = 3,000.

108. See *supra* text accompanying note 45.

109. See Appendix Three: Shakespeare Play Baseline Data, Round One Tests; Figure 3.4.

110. See Figure 3.4.

discrepancy between Shakespeare's open-line play-verse range from 1579 to 1591 (11-32%) and Oxford's iambic pentameter 1576-1593 poem score (7%) start to look suspicious.<sup>111</sup> All Oxfordian re-dating efforts, from the oldest ones by Eva Turner Clark<sup>112</sup> to the most recent by W. Ron Hess,<sup>113</sup> threaten to turn Oxford's narrow pass for open lines into a rejection. They weaken, rather than strengthen, the argument that Oxford fits within the Shakespeare profile.

*Feminine Endings.* These are lines ending on an unstressed syllable, with words such as "gotten" or "running." They are not sensitive to editing, but they are considered sensitive to prosody and require iambic pentameter to iambic pentameter comparison in like-sized, 1,500-word blocks. Oxford fails this test decisively. Compared to Shakespeare's poem range, in which the lowest percentage was five and highest was twenty-five, Oxford has no feminine endings at all. But this test, too, is sensitive to time of composition. Feminine ending percentages increased by a half or more in Shakespeare's plays, conventionally dated,<sup>114</sup> as they do by the Hess dating,<sup>115</sup> but not by the old Clark dating.<sup>116</sup>

As with open lines, if conventional dating of the plays is correct and allowance is made for the clear upward trend in play verse, one could plausibly argue that Oxford's lack of feminine endings fits comfortably below the bottom of a long upward trendline which is documented from 1590 on and might well have started earlier. Conventional dating calls into question this test's rejection.

But such questions would disappear under Oxfordian re-dating. The Clark dating<sup>117</sup> crams almost every Shakespeare play back into the 1570s and 1580s, obscures the trend line, and makes Oxford's lack of feminine endings a glaring mismatch with Shakespeare. This is essentially what we reported in our 1991 *Notes and Queries* article, in which we used Charlton Ogburn, Sr.'s dates, which are similar to Clark's.<sup>118</sup> The Hess re-dating<sup>119</sup> is less radical about the time rollback and better at preserving trendlines in the plays. But the trendline is still less distinct than with conventional dating, and Oxford's poems, with no feminine endings at all, are still glaringly out of line with Shakespeare plays that Oxfordian re-dating portrays as contemporary with Oxford's poems.

111. See Figure 5.

112. EVA LEE TURNER CLARK, *HIDDEN ALLUSIONS IN SHAKESPEARE'S PLAYS: A STUDY OF THE EARLY COURT REVELS AND PERSONALITIES OF THE TIMES* (Ruth Loyd Miller ed., Kennikat Press 3d ed. 1974) (1930) (first published as *SHAKESPEARE'S PLAYS IN THE ORDER OF THEIR WRITING*).

113. Hess, *supra* note 73; see Figure 3.5.

114. See Figure 3.1.

115. See Figure 3.3.

116. See Figure 3.2.

117. See *id.*

118. See Elliott & Valenza, *True Shakespeare*, *supra* note 92, at 504-05.

119. See Figure 3.3 and accompanying text.

Again, the Oxfordian re-dating weakens, not strengthens, the case for a match with Shakespeare.

*Enclitic and Proclitic Microphrases.* These tests count instances in which certain “clinging monosyllables,” stressed in natural speech, lose the stress for metrical reasons.<sup>120</sup> Oxford’s iambic pentameter poems fall below the bottom of our Shakespeare 1,500-word-block profiles for both of these tests, and hence, suffer two more clear Shakespeare rejections. A generous sampling of 108 1,500-word blocks from all of Shakespeare’s core poems and eight of his plays provided no indication that his rates on either test increased or decreased during his lifetime.<sup>121</sup> Of our 108 Shakespeare samples, only three had enclitic readings as low as our one Oxford sample.<sup>122</sup> None had proclitic readings anywhere near Oxford’s abysmal 115.<sup>123</sup>

#### D. Summary of Oxford Rejections

After all the refining and updating, the Oxford candidacy fares no better today than it did in 1990. His poems now have seven Shakespeare rejections in fifteen tests, far too many to look like Shakespeare to us or to our computer, which calculates the Discrete odds against so many rejections arising by chance from Shakespeare as 400,000 times worse than those for his own most discrepant block. The Continuous composite odds are 150 trillion times worse. These comparative probabilities reveal that Shakespeare and Oxford belong in different galaxies; the odds that either could have written the other’s work are far lower than the odds of their having been struck and killed by lightning. Three of Oxford’s rejections could be time-sensitive. However, trying to run Oxford’s poems against Oxfordian-backdated plays only makes the mismatches more glaring, not less.

#### E. A Comparison of Orthodox and Oxfordian Chronologies

To compare orthodox and Oxfordian chronologies, we consulted the most evolved Oxfordian chronology, that of W. Ron Hess,<sup>124</sup> and the earlier ones it

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120. See Elliott & Valenza, *There Were None*, *supra* note 103, at 201 (discussing enclitic and proclitic microphrases); see also MARINA TARLINSKAJA, SHAKESPEARE’S VERSE: IAMBIC PENTAMETER AND THE POET’S IDIOSYNCRASIES 208-22 (1987) (providing general information on proclitic and enclitic phrases and discussing Shakespeare’s use of the phrases in his works).

121. See Appendix Seven: Shakespeare Poems Baseline Data, Blocksize = 1,500; Appendix Seven: Shakespeare Play Verse Baseline Data, Blocksize = 1,500. The eight plays are *Richard II*, *Richard III*, *Titus Andronicus*, *Romeo and Juliet*, *Troilus and Cressida*, *Antony and Cleopatra*, *The Tempest*, and *A Winter’s Tale*.

122. See Appendix Seven: Shakespeare Poems Baseline Data, Blocksize = 1,500; Appendix Seven: Shakespeare Play Verse Baseline Data, Blocksize = 1,500.

123. See Appendix Seven: Other Poets Versus Shakespeare Baseline, Blocksize = 1,500.

124. See Hess, *supra* note 73.

replaced. Commendably, Hess acknowledged the conjectural aspects of assigning dates to plays<sup>125</sup> and attempted to respond to our 1991 challenge to reshuffle Oxfordian dating to reflect what looks like clear stylistic trends in Shakespeare's plays, by conventional dating, while ensuring that the trends stop after Oxford's death in 1604.<sup>126</sup> As we have seen, the stylistic trends help the early Oxford "fit" by showing that some of his rejections are just what one might expect from extrapolating Shakespeare's trendlines backwards. But these trends do not fit Oxford at all if they continued after his death—unless Oxford's death was faked, as some Oxfordians briefly tried to argue after *A Funeral Elegy* (clearly dated in 1612) was mistakenly attributed to Shakespeare.<sup>127</sup>

The Hess chronology was an improvement over the older chronologies of Eva Turner Clark and the senior Ogburns. Like the Clark/Ogburn dating, the Hess chronology backdates the plays far enough to squeeze them into Oxford's lifetime but not enough to obliterate the trends. Hence, it looks to us like a forthright, first-cut response to the challenge we issued in our 1991 *Notes and Queries* article. If nothing else, it provides us with the opportunity to take a closer look at the question of play chronology, to see how it looks on the numbers, and to examine how much changing the dating would influence a major ascription controversy. This may be of pertinence not only to the Oxfordian controversy but also to efforts by mainstream scholars like Alfred Cairncross, much cited by Charlton Ogburn, Jr., to push back the dating of Shakespeare's plays.

#### F. Lack of Oxfordian Consensus

Although both Oxfordian and mainline Stratfordian dating have always been speculative, Oxfordian dating seems even more speculative and less settled than Stratfordian. Examining successive editions of the *Riverside* or comparing the *Riverside* chronology to other leading contemporary Shakespeare chronologies, E.K. Chambers's chronology, or nineteenth-century

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125. *Id.* at 28.

126. See Elliott & Valenza, *True Shakespeare*, *supra* note 92, at 504 (identifying problems with conventional Oxfordian dating).

127. We and a few others have long doubted that *A Funeral Elegy* was written by Shakespeare, and hence, it was no obstacle to the Oxford claim. We turned out to be right. As with Oxford's poems, our tests say that *A Funeral Elegy* is on a different galaxy from Shakespeare, but in the same infield with Ford. See VICKERS, *supra* note 41; Elliott & Valenza, *Glass Slippers*, *supra* note 74, at 187-201; Elliott & Valenza, *Smoking Guns*, *supra* note 54, at 205-10; Posting of Richard J. Kennedy, rkennedy@orednet.org, to editor@shaksper.net (Mar. 1, 1996), at <http://www.shaksper.net/archives/1996/0152.html> (on file with the *Tennessee Law Review*); Appendix Six: Other Poets Versus Shakespeare Baseline, Blocksize = 3,000. In 2002 Donald Foster conceded that our ascription of *A Funeral Elegy* was right and his was wrong, and *A Funeral Elegy* has not been heard from since. See Posting of Donald Foster, *supra* note 40.

chronologies, reveals that the resemblances between different estimates seem highly persistent. The order and dates of individual plays may differ somewhat from one estimate to another, but the same plays appear repeatedly in the same broad classifications: early, middle, and late. As Peter Moore put it, “Chambers dead is stronger than his successors alive.”<sup>128</sup>

Thanks to Mr. Hess’s collection of different versions of Oxfordian dating over the years, it is possible to compare Oxfordian estimates with one another.<sup>129</sup> Today these dates are much more scattered than they were in the early days. There are gaps of ten to twenty years between some alternative versions. The senior Ogburns’ dating turns out to be almost a carbon copy of Eva Turner Clark’s dating,<sup>130</sup> with no two dates for the same play more than two years apart.<sup>131</sup> However, the senior Ogburns’ tight consensus was little heeded either by Charlton Ogburn, Jr.,<sup>132</sup> Ron Hess,<sup>133</sup> or Peter Moore,<sup>134</sup> on whom Hess relied for about half of his seventeen “anchor” dates.

Moore challenged conventional Stratfordian dating (specifically that of Chambers) as speculative and inconclusive and offered new backdates for ten plays, which he also acknowledged to be speculative and inconclusive.<sup>135</sup> He criticized Francis Meres’s 1598 list as incomplete and Philip Henslowe’s “ne” entries, which affect two Shakespeare plays, as probably meaning something other than “new.”<sup>136</sup> Both points seem plausible, though we doubt that Meres’s known early-play omissions, *The Taming of the Shrew* and the *Henry VI* series, from a list of twelve to thirteen plays are enough to justify abandoning him entirely as a point of reference. Considering the even-more-speculative alternatives, we think it makes more sense to take account of the imperfect play list than to ignore it just because it missed a play or two. Ultimately, Moore proposed the following tentative backdates: “*Titus Andronicus*, circa 1585; *Comedy of Errors*, 1587-88; *King John*, circa 1590;

128. Peter R. Moore, *The Abyss of Time: The Chronology of Shakespeare’s Plays*, 5 ELIZABETHAN REV. 24, 25 (1997).

129. Compare Hess, *supra* note 73 at 40-57, with Appendix Ten.

130. Compare DOROTHY & CHARLTON OGBURN, THIS STAR OF ENGLAND: “WILLIAM SHAKESPEARE” MAN OF THE RENAISSANCE (1952), with CLARK, *supra* note 112.

131. This means that the “roaring gaffes” that Hess claims we felt “obliged to correct without comment or apology” on our website (i.e., by substituting Clark’s supposedly superior dates for the Ogburns’ supposedly inferior ones) would be less than roaring even if they were true, see Hess, *supra* note 73, at 39, and they are not true. “Clark” is the name of Terry Ross’s server and has nothing to do with Eva Turner Clark. Terry Ross, not us, did the posting to his own website, not ours, using our original Ogburn dates, not our amended Clark dates or anyone else’s. Clark’s and the Ogburns’ dates, in any case, are so close to each other that substituting either for the other could not have made any visible difference on our chart.

132. See OGBURN, *supra* note 2.

133. See Hess, *supra* note 73.

134. See Moore, *supra* note 128, at 36-60.

135. *Id.* at 24-60.

136. *Id.* at 27-28.



*Romeo and Juliet*, 1591; *Henry IV, Part I*, by 1592; *Henry V*, 1592-99; *As You Like It*, 1593-94; *Hamlet*, ?1594; *Macbeth*, perhaps 1600-01; *Pericles*, by 1604.”<sup>137</sup> He immediately, and appropriately, added that “some of the pieces of evidence underpinning this list are strong, others are weak.”<sup>138</sup> He also properly observed, as Chambers had, that evidence of earliest possible dates tends to be “weak stuff” compared to evidence of latest possible dates.<sup>139</sup>

Our inclination here, for the moment, is not to examine his evidence in detail. Instead, we shall take him at his word, note that he attempted only ten backdates for thirty-eight plays, all tentative, and note also that the spread between his tentative dates and those of the *Riverside* averages only five or six years, not the twelve or more years found in other Oxfordian dating. In general, we find Moore’s external evidence more cautious and more persuasive than Hess’s or Clark’s, though no more persuasive than the conventional, Chambers-derived evidence that Moore criticized. We would also guess from looking at Figures 3.1, 3.4, and 3.6 that some of his proposed backdates, such as *Titus Andronicus*, *The Taming of the Shrew*, and *The Comedy of Errors*, might fit the conventional trendlines every bit as well as the conventional dates for these plays, maybe better. Major differences remain between Hess’s bold, comprehensive estimates and Moore’s cautious, limited ones, and between Hess’s and Moore’s estimates and the older Oxfordian estimates. Current consensus among Oxfordians, after eighty years of trying to get the dates right, still seems to be anything but tight.

#### G. Problems with External Evidence

We have no idea whether Oxfordians will ever be as agreed on chronology as they once were or as mainline Stratfordians seem to be now. Surely the answer will and should depend largely on external evidence, a subject on which we have never pretended to be authorities. But we do not believe that the Hess chronology will be the last word on the subject. For example, even an amateur studying Eva Turner Clark’s actual evidence that Oxford wrote *Richard III* in 1581 might have misgivings about making it an “Anchor Play” in any chronology, as Hess has done. Clark’s basis for imagining this date is that Oxford was in the Tower of London in 1581, that there are similarities between *Richard III* and a letter Oxford wrote to his father-in-law in 1581, and that *Richard III* makes more references to the tower than Shakespeare’s other

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137. *Id.* at 55. *The Riverside* provides the following dates for the plays listed by Moore: *Titus Andronicus*, from late 1594; *Comedy of Errors*, from 1594; *King John*, 1596; *Romeo and Juliet*, 1596; *Henry IV, Part I*, 1597; *Henry V*, 1599; *As You Like It*, 1599; *Hamlet*, 1601; *Macbeth*, 1606; *Pericles*, 1608. *THE RIVERSIDE SHAKESPEARE*, *supra* note 2, at 78-86.

138. Moore, *supra* note 128, at 55; *see also id.* at 43-44, 46 (discussing the difficulty of dating *King John*, *Henry IV, Part I*, and *Henry V*).

139. *Id.* at 28.

history plays.<sup>140</sup> Such “evidence” seems skimpy and far-fetched compared to, for example, the mainline dating of *As You Like It* at 1599. *As You Like It* is not mentioned in Meres’s compendious (though not quite exhaustive) 1598 list of Shakespeare plays known to him, but it was “stayed” in the Stationer’s Register on August 4, 1600, and its song, *It was a lover and his lass*, was published in Thomas Morley’s *First Book of Aires*, 1600.<sup>141</sup> This evidence suggests that *As You Like It* should not be dated before 1598 and certainly not after 1600. Also convincing is the evidence for the 1613 dating of *Henry VIII* (*All Is True*), which was being performed when the Globe Theater burned down on June 29, 1613 and reportedly was performed no more than two or three times previously.<sup>142</sup>

Hess’s “Anchor Dates” appear in boldface in our Appendix Ten; we have also bolded dates we consider better substantiated than most in our *Riverside* Date Late column. The most interesting cases are *As You Like It* and *Henry V*. We would anchor both plays in 1599 for essentially the reasons mentioned for *As You Like It*: the play is not mentioned in Meres’s list, but it was found in the Stationer’s Register and in other convincing references (such as a “bad quarto” of *Henry V*) in 1600. Hess would anchor them, respectively, in 1593 and 1592, following Moore.<sup>143</sup> Moore’s evidence for both plays<sup>144</sup> turns out to be extremely speculative. He argues that because *As You Like It* seems to refer to Marlowe’s death in 1593, it therefore must have been written shortly afterward.<sup>145</sup> We do not think this necessarily follows. Moore also argues that “Shakespeare’s reference to Essex in Ireland in 1599 [in *Henry V*] bears the marks of revision of an earlier text” and shows the play to have been a revival.<sup>146</sup> He concedes, however, that he has “offered no positive evidence for an earlier date for the play.”<sup>147</sup>

Hess and the other Oxfordians pay little attention to Shakespeare’s three reported collaborations with John Fletcher around 1613: the lost *Cardenio*, *Henry VIII*, and *The Two Noble Kinsmen*. The dates of the first two seem better substantiated: recorded payments to the King’s Men for two 1613 performances of “*Cardenno*,”<sup>148</sup> and Sir Henry Wotton’s letter to Sir Edmund Bacon describing the burning of the Globe Theater during the performance of a “new Play, called *All is true*, representing some principal pieces of the reign of Henry VIII.”<sup>149</sup> If these relatively well-documented collaborations with Fletcher were done while Shakespeare was alive, as we believe collaborations

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140. CLARK, *supra* note 112, at 416-17, 425.

141. WELLS & TAYLOR, *supra* note 2, at 121.

142. *Id.* at 133.

143. See Hess, *supra* note 73, at 50; Moore, *supra* note 128, at 55.

144. See Moore, *supra* note 128, at 46-48.

145. See *id.* at 47-48.

146. *Id.* at 47.

147. *Id.*

148. WELLS & TAYLOR, *supra* note 2, at 132-33.

149. *Id.* at 30 (providing a reproduction of Sir Henry Wotton’s letter).

generally were then and are now, it poses a grave problem for the claim for Oxford, who died in 1604. If the collaboration were posthumous, it raises the same question as Oxfordian ascriptions do generally: If Oxford wrote his half of these plays in 1601, 1603, or “not later than 1592,” why did Fletcher wait ten or twenty years to get the other half written?

Besides listing in Appendix Ten three of the Oxfordian chronologies to compare with the *Riverside*, we have also included a column called “First Clear Mention.” This column records the date when we consider a play to have first been clearly identified, whether by Meres, by an entry in the Stationer’s Register, by publication of a quarto version, or by a report by someone having attended the play or having heard about it. Comparing “first clear mention” dates with the *Riverside* and Hess chronologies makes a striking contrast. Of the thirty-eight plays listed, thirty-four had a “first clear mention” other than the pertinent, sometimes decades-later Folio edition. For these thirty-four plays, the average lag between the *Riverside* estimated date and the first clear mention is a year and a half.<sup>150</sup> For the thirty-three of these thirty-four plays dated by Hess, the average lag is eleven and a half years!<sup>151</sup> For the Clark/Ogburn dating, the lag would be even longer.<sup>152</sup>

Where did Hess get all those eleven-and-a-half-year lags? In most cases, out of a hat, as he freely admits: “So, to preserve the monotonic stylistic continuum for [the half of the plays he did not “anchor”], *wherever there are no better reasons to date a play we simply subtract twelve years from the Elliott/Riverside date for that play.*”<sup>153</sup> His most remarkable feats of backdating—the backdating of most of the plays conventionally dated after Oxford’s death—are typically accomplished by this disarmingly simple expedient, without even a nod to external evidence. He simply marks the play

150. See Appendix Ten: Chronological Indicators in Shakespeare’s Plays, *Riverside* Late Dating (“1st clear”-“Rdate Late” columns).

151. See *id.* (“1st clear”-“Oxfr Hess” columns).

152. These long lags do not ring true to us. It is almost like asking us to suppose that Oxford, because he wished to hide his authorship of Shakespeare’s plays, must have hidden the plays for twelve years. Showbiz people do not often do that. Most people who write or produce shows want them performed for an audience, measure their success by how their shows perform at the box office, and do what they can to get their plays noticed on opening night. Here in Claremont, just up the road from Hollywood and Disneyland, we hear tons about this season’s releases, ounces, at most, about last season’s, and nothing at all about whatever was the rage twelve years ago. Who would suppose that Elizabethans in showbiz, even if they were trying hard to hide the authorship of new plays, would routinely keep their plays under wraps for twelve years before the word leaked out and someone managed to get them registered, printed, reviewed, or recorded? It would be as if none of the dozens of films with screenplays covertly written by blacklisted Hollywood screenwriters in the Eisenhower years, such as the 1957 film *Bridge on the River Kwai*, received any lasting mention until Richard Nixon was president. No one would expect such a thing to happen, and it did not.

153. Hess, *supra* note 73, at 34 (emphasis added).

“[s]tylistically, transferred from 1608 to 1596,”<sup>154</sup> and the job is done. As Lady Macbeth said, “A little water clears us of this deed.”<sup>155</sup>

#### *H. Problems with Internal Evidence*

But has it? Let us acknowledge, again, that external evidence is often skimpy, tricky, and inconclusive; that we do not pretend to follow it closely; and that we have rarely been picky about claimant-advocates’ external-evidence suppositions, no matter how far-fetched. What then does the internal evidence say? In addition to summarizing the various chronologies, Appendix Ten also provides a summary of the following various stylistic chronological indicators: feminine endings (FEs), open lines (OLs), midline speech endings (MLEs), light endings, weak endings, *most*’s per 10,000 words, colloquialisms, and archaisms.<sup>156</sup> Every stylistic indicator except archaisms increased during Shakespeare’s writing lifetime, conventionally reckoned.

#### *I. Feminine Endings*

Figure 3.1 illustrates the upward trend of feminine endings by conventional dating, from as low as 5% in the 1590s to as high as 35% in the early 1600s. It is neither ruler-straight nor ruler-thin, but it is smooth enough, tight enough, and consistent enough that our Excel spreadsheet drew a nice, straight, slanting trendline (not pictured) that could be extrapolated downward to cross zero at 1580. Such a line, as we have seen, might arguably spare Oxford’s iambic pentameter poems from a rejection, though they do not have a single feminine ending because they were mostly written before the earliest of Shakespeare’s poems and plays. But conventional dating shows that the upward trend in FEs continued for almost a decade after Oxford’s death. As we noted in 1991, if true, this fact would be the worst of news for the Oxford claim.

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154. *Id.* at 55 (suggesting the likeliest dating for *Coriolanus*).

155. WILLIAM SHAKESPEARE, *THE TRAGEDY OF MACBETH* act 2, sc. 2, line 64.

156. See generally WELLS & TAYLOR, *supra* note 2, at 104-05 (tabulating “colloquialisms” and “negative”-trending words with endings like *-eth*, which we call “archaisms” in Appendix Ten).

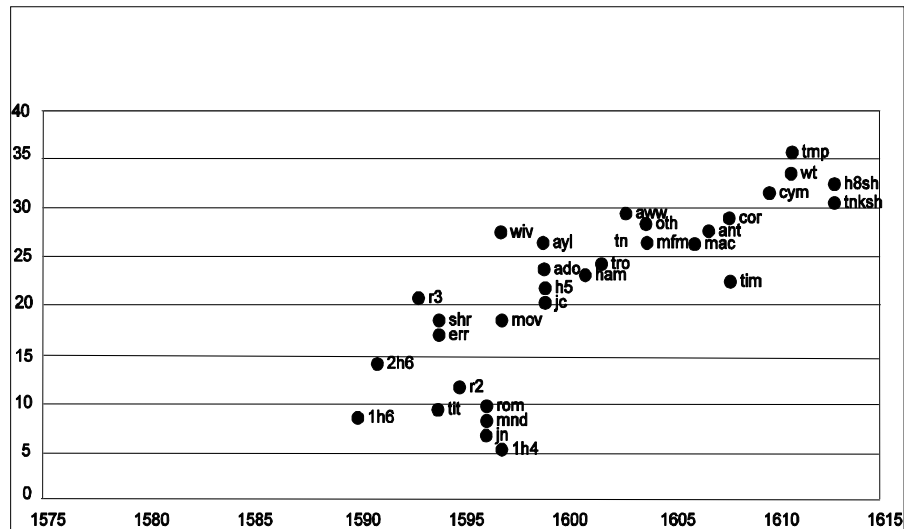
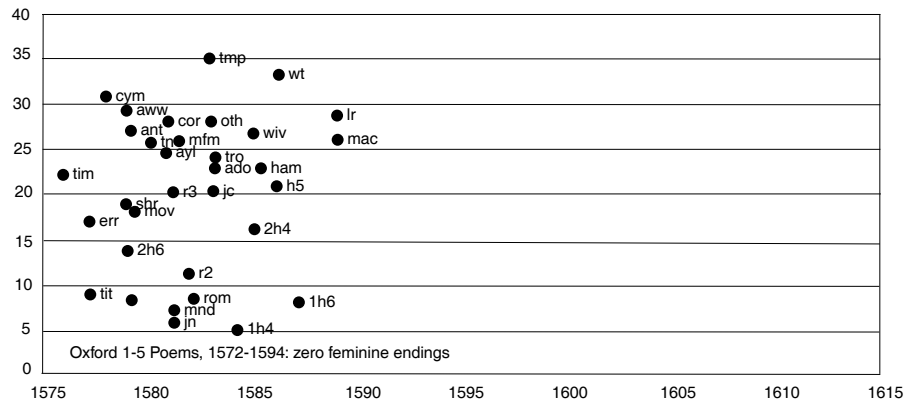
Figure 3.1. Feminine Endings, Shakespeare Plays, *Riverside* Late Dating

Figure 3.1. By conventional, *Riverside* dating, Shakespeare's feminine-endings percentages increased throughout his lifetime and continued to do so after the death of the Earl of Oxford in 1604.

The old Clark/Ogburn Oxfordian backdating solved the posthumous trend problem by trying to push every Shakespeare play but one<sup>157</sup> into the 1570s and 1580s. As long as one suspends skepticism of their external evidence, this backdating would more than solve the problem of posthumous trends because it would obliterate every sign of a trend. Excel draws a horizontal trendline (not pictured) halfway up the cloud of FE percentages, and as shown in Figure 3.2, the mismatch with Oxford's rock-bottom FE percentage becomes impossible to dodge.

157. The exception was *Henry VIII*, not marked in Figure 3.2 but Oxford-dated at 1601 or 1603.

Figure 3.2. Feminine Endings, Shakespeare Plays, Clark Late Dating



obscured, and Oxford's poems, with no feminine endings at all, become a clear mismatch with Shakespeare.

### *J. Open Lines*

Similar conclusions might be made from open-line trends. As shown in Figure 3.4, Oxford's iambic pentameter poems barely pass our Shakespeare threshold for open lines, and their low percentages are about what you might expect from backward-extrapolating Shakespeare's open-line trendline by conventional dating. If Hess's re-dating affects this conclusion at all, as Figure 3.5 illustrates, the backward-extrapolation overshoots Oxford's poems and makes them seem anomalously low compared to Shakespeare's plays supposedly written at the same time. Again, if anything, it weakens the internal evidence of possible common authorship. In this case, the Hess trend looks clear to the eye, but the Excel-drawn trendline (not pictured) is still flat.

Figure 3.4. Open Lines, Shakespeare Plays, *Riverside* Dating Open Lines

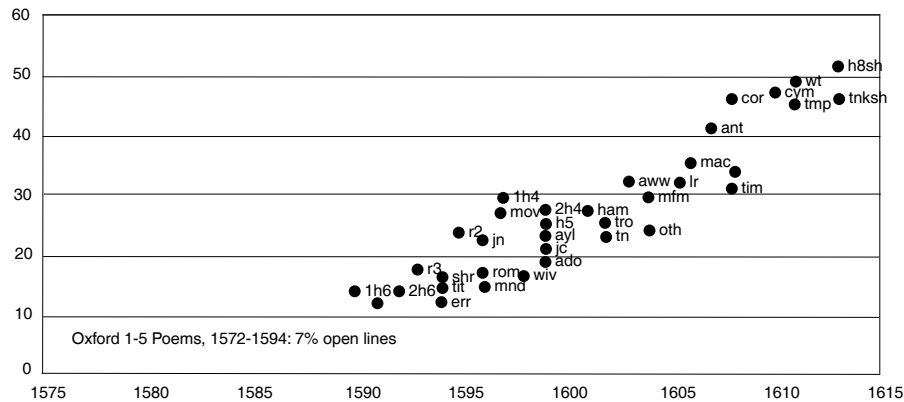


Figure 3.4. By *Riverside Shakespeare* late dating, Oxford's poems barely fit early Shakespeare's open-line profile; the rising trend in open lines continues after Oxford's death.

Figure 3.5. Open Lines, Shakespeare Plays, Hess Dating

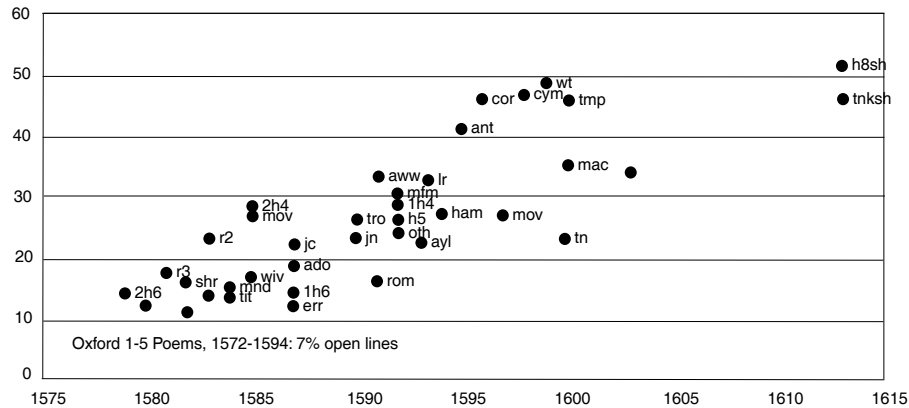


Figure 3.5. Hess's re-dating makes Oxford's 7% open lines look anomalously low.

We shall spare the reader plots of comparable tests using light endings, weak endings, *mosts*, colloquialisms, and archaisms. They generally repeat the lessons taught by FEs and OLs—clear upslanting trends (downslanting for archaisms) by *Riverside* dating, most of them continuing after Oxford's death, and not-so-clear trends by Oxfordian dating, none continuing after Oxford's death. We shall also pass over some very interesting studies by Kent and Charles Hieatt and Anne Lake Prescott<sup>158</sup> and by Donald Foster<sup>159</sup> that conclude from vocabulary overlap that some of Shakespeare's poems must have been written well into the seventeenth century. Instead of examining these studies, we shall close with some charts of midline speech endings, which by conventional dating increased from as low as 1% in the 1590s to over 90% in the 1600s. In Figure 3.6, the *Riverside* MLE upward trend looks tight, smooth, and steep; Excel drew us a nice, steep, slanted line (not pictured). In Figure 3.7, the Hess trend looks clearly upward to the eye, but much less tight and smooth. Excel again drew a flat, equivocal trendline (not pictured).

158. See Hieatt et al., *supra* note 2, at 98.

159. See Donald W. Foster, *SHAXICON 1995*, SHAKESPEARE NEWSL. (Iona College, New Rochelle, NY), Summer 1995, at 1, 30, 32; Donald W. Foster, *Shaxicon and Shakespeare's Acting Career: Reply to Diana Price*, SHAKESPEARE NEWSL. (Iona College, New Rochelle, NY), Fall 1996, at 57-58; Donald W. Foster, Abstract of Shakespeare's Career as Reconstructed by SHAXICON 2.0 (1994) (unpublished manuscript, on file with author). But see Charles W. Hieatt et al., *Attributing A Funeral Elegy*, 112 PUBL'NS MOD. LANGUAGE ASS'N AM. 429, 429-32 (1997) (questioning the reliability of Foster's Shaxicon program); Diana Price, *SHAXICON and Shakespeare's Acting Career*, SHAKESPEARE NEWSL. (Iona College, New Rochelle, NY), Summer 1996, at 27-28, 46 (challenging the accuracy of Foster's Shaxicon dating for Shakespeare by examining the external evidence of Shakespeare's acting career).



Figure 3.6. Midline Speech Endings, Shakespeare Plays,  
*Riverside* Late Dating

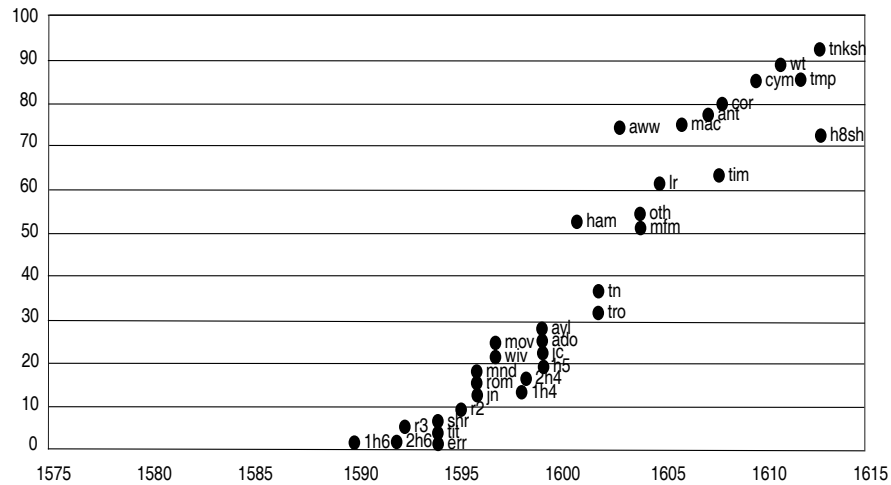


Figure 3.6. Under *Riverside* dating, midline speech endings form a tight, steep, smooth uptrend throughout Shakespeare's life, continuing after Oxford's death.

Figure 3.7. Midline Speech Endings, Shakespeare Plays, Hess Dating

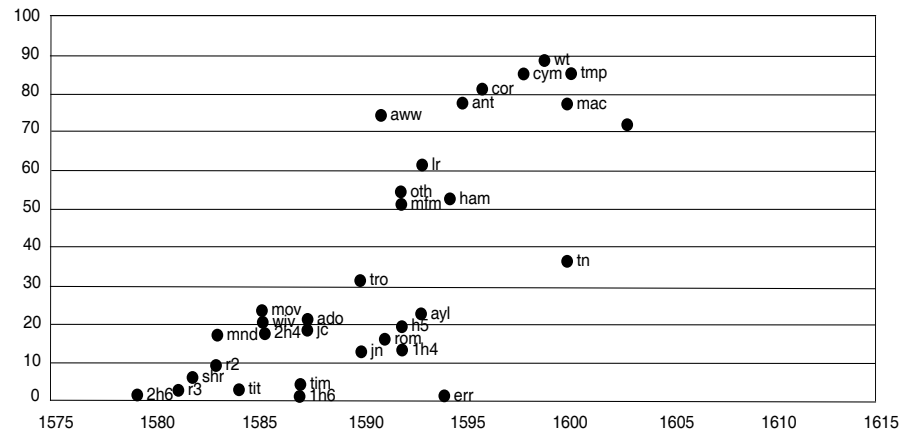


Figure 3.7. Midline speech endings trends under Hess dating are more scattered and thus less clear than under *Riverside* dating.

### K. Midline Speech Endings

What if we had no external evidence at all but wanted to guess the sequence of the plays purely from one strong stylistic trend? Simply counting and ranking each play's percentage of MLEs would produce a sequence that

in only three cases differs from the *Riverside* sequence by more than three places.<sup>160</sup> In other words, only 8% of the 38 MLE-percentage-ranked plays differed from the *Riverside* sequence by more than three rank places.<sup>161</sup> The same exercise relative to the Hess sequence would produce eighteen such anomalies,<sup>162</sup> about half of the thirty-four plays Hess dated.

Such comparisons, of course, rest on the conjecture that one apparent trend, under one set of assumptions, can actually serve as independent evidence of a sequence. We consider this conjecture more plausible than Hess's conjecture that arbitrarily lopping off twelve years from half the *Riverside* dates and calling it a "stylistic transfer" will improve their accuracy. Neither we, nor any Oxfordian scholar we know, has found as tight, steep, or smooth a trendline for any other indicator, under any set of Oxfordian assumptions, as we have found for the eight indicators treated here under Stratfordian assumptions.

If the Hess dates were any stronger on external evidence than the *Riverside* dates, sequencing comparisons might reveal that MLE percentages, though tighter, smoother, and steeper with *Riverside* dates, nonetheless make for a bad ranking. Where the *Riverside* dates seem (1) stronger and more consistent with other Stratfordian chronologies, as they do to us, and (2) freer from such gross counterindicators as the Fletcher collaborations and the supposed eleven-year gap between the average play's debut and the first clear mention of it, MLE percentages are yet another indicator that Oxfordians still have work to do to date the plays satisfactorily.

#### *L. Conclusions on Chronology*

The new Hess dating seems less formless and relentlessly confined to antiquity than the old Clark/Ogburn dates, and somewhat more systematic and attentive to comparative perspectives and external evidence. But Oxfordian dates still seem more scattered than Stratfordian, less well founded in external evidence, and much more loosely and haphazardly sequenced, as measured by tightness, smoothness, and steepness of internal indicators. The blank spot for the Fletcher collaborations, the wholesale lopping off of twelve years from the *Riverside* dates, and the long implied gap between opening night and first mention, all seem like severe drawbacks and imply that there is much room for further improvement in Oxfordian dating. Taken at face value, Oxfordian backdating does avoid the problem of play trends continuing well past

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160. Two of the three exceptions are from jointly written plays. The three exceptions are *All's Well That Ends Well* (MLE percentage is six places later than *Riverside*), Shakespeare's part of *Pericles* (MLE percentage is four places earlier), and Shakespeare's part of *Henry VIII* (MLE percentage is seven places earlier).

161. Compare Appendix Ten (Riv. Seq. column), with Appendix Ten (MLE Seq. column).

162. Compare Appendix Ten (Riv. Seq. column), with Appendix Ten (Hess Seq. column).

Oxford's death, but only by compounding the dissimilarities between Oxford's poems and Shakespeare's backdated "contemporary" plays.

After years of augmentation and refinement, our stylometric tests still show that Louis Bénézet's inference that Oxford's style was all but indistinguishable from Shakespeare's was dead wrong. When one uses a computer to test sizeable blocks, it is anything but indistinguishable. Oxford failed four of our six available tests in 1990. Now he fails seven of fifteen tests, many more than the most errant like-sized block in our core Shakespeare poem baseline, and enough to put him and Shakespeare in different statistical galaxies. Four of the seven Oxford rejections are not time-sensitive and are not affected at all by the proposed re-dating. The other three are time-sensitive, but the new Oxfordian backdating (though generally better than the old ones) still makes for *stronger* rejections than Stratfordian dating because the rejections make Shakespeare's plays look more contemporary than Oxford's poems and Shakespeare's poem-mismatches with Oxford appear more glaring. We think the Shakespeare Clinic has removed one serious objection to the Oxford candidacy by showing that *A Funeral Elegy* was not written by Shakespeare,<sup>163</sup> but the Clinic's overall effect has been much more to show differences between Shakespeare and Oxford than to show resemblances.

#### *M. Possible Discounts*

Are there any counter-arguments left for Oxfordians or others to deflect or discount our findings? Did not Karl Llewellyn, in a well-known article in the *Vanderbilt Law Review*, counsel that for every thrust of statutory interpretation there must always be a parry?<sup>164</sup> If, like the two Oxfordian panelists, we were pretending to prosecute Oxford for being the True Shakespeare, we could easily think of some parries we might use, but we are not so sure that any of them would convince a jury. The prosecution could always plead novelty. Our methods were new and experimental; they still are. However, they have evolved over the years, and we have continued to discard some tests and modify others. We would be the last to suppose that this process has stopped or that what we have arrived at today will be the last word tomorrow. On the other hand, after fifteen years of availability for refutation, the first rounds of criticism knocked out only one of our tests (among many), and subsequent rounds have barely changed our results at all. Under the circumstances, we can hardly help feeling a bit less tentative than we did in 1990 or 1994.

The prosecution could also ask for what amounts to a dirtier baseline than

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163. See Elliott & Valenza, *Oxford Candidacy*, *supra* note 74.

164. See Karl N. Llewellyn, *Remarks on the Theory of Appellate Decision and the Rules or Canons About How Statutes Are to Be Construed*, 3 VAND. L. REV. 395, 401-06 (1950) (listing the "thrusts" and "parries" for statutory interpretation arguments).

ours, one that includes material that we consider doubtful or co-authored. It has been done. If we went along with it, it would probably expand some of our needle's-eye Shakespeare profiles enough to get a camel or two through them. Or maybe they could try to shrink the camel by demanding the inclusion of more "Oxford Apocrypha," such as the play *Horestes*, or the poems of "Meritum Petere Grave" or other such posies in George Gascoigne's *A Hundreth Sundrie Flowres*, claimed as Oxford's by one Oxfordian scholar or another, in hopes that one of them might pass our tests; but our tests reveal that such hopes are pretty dim.<sup>165</sup> They lengthen the already long chain of speculative evidence and, more often than not, make the camel bigger, not smaller.<sup>166</sup>

Departing from the prosecutorial model in which prosecutors normally carry the burden of proof beyond a reasonable doubt, critics could ask us to meet a heavier burden of proof, citing the same limitations of our tests that we acknowledge in Part II and the "Baseline" and "Remarks" columns of Table 3.1, and rejecting our proof unless and until we do more tests on more texts. More appropriately, though, they could perform the extra tests themselves and possibly justify different conclusions. Are Shakespeare's 45,000 words of poems enough of a baseline for a convincing test ("A" and "C" under "Shakespeare Baseline" in Table 3.1), or do you also need the 246,000 words of play verse ("B")? Or is an even larger play verse baseline needed because "B" does not include all of Shakespeare's play verse? "Time" has not turned out to be a big discount relative to Oxford, so far at least, but what about "editing," "prosody," or even "subject-matter?" These are only a few of the possible limitations. We can think of more, and we can think of other tests we might have tried.<sup>167</sup> It would take more time and work than we consider appropriate, considering the one-sidedness of the evidence we already have, but any of these tests might be a good starting point for a critique of our work. We note, however, that these, too, have been available for fifteen years and that none of our critics has pursued them far enough to begin to make a successful challenge to our results.

#### N. *Grub or Butterfly?*

The last-resort parry, and in our view, the closest thing to a defense left for the Oxford candidacy against evidence like ours, would be to do what at least one Oxfordian writer has already done: concede our evidence, that Oxford's

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165. See *supra* note 103 and accompanying text.

166. None of these "Oxford Apocrypha" come close to fitting Shakespeare's profiles. See Elliott & Valenza, *There Were None*, *supra* note 103, at 214, 240; Elliott & Valenza, *True Shakespeare?*, *supra* note 92, at 503.

167. See Elliott & Valenza, *There Were None*, *supra* note 103, at 207-10 (listing additional types of tests that could have been utilized and noting the "cautions" and "caveats" associated with the testing process).

style, as we know it, is indeed in a different galaxy from Shakespeare's, but reject our conclusion that he therefore probably is not a Shakespeare "could-be."<sup>168</sup> Why not instead suppose that the observed differences are more developmental than essential, more like those between a grub and a butterfly than like those between a sow's ear and a silk purse? Would not Oxford's wobbling baby steps be just what we would expect of someone as young and old-fashioned as Oxford was before blazing forth from his cocoon as the immortal Shakespeare? Would it not, in fact, help solve the mystery of how Shakespeare managed to start out a full-grown butterfly with no sign of ever having taken baby steps or having been a journeyman grub? In sum, the very baby-step stylistic discrepancies with Shakespeare that we observe in Oxford's work should enhance his claims, rather than diminish them.<sup>169</sup>

As Stephanie Hughes, editor of *The Oxfordian*, stated:

We're not dealing with just any writer here, but a genius on the scale of Leonardo da Vinci or Mozart. Early Mozart can be confused with Haydn, late Mozart with Beethoven . . . . If we didn't know for a fact that Picasso had a Blue Period, if all we knew of him was his work from Cubism on, we'd never believe that those early works were his. When we read anything from the seventies and compare it with Shakespeare, and note the immense growth and changes in only twenty years, we can hardly expect that tests that compare early works with late works will give a meaningful result.<sup>170</sup>

In John Shahan's words, "developmental factors may account for any stylistic differences between Oxford's early poems and Shakespeare's mature ones."<sup>171</sup>

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168. See Shahan, *supra* note 74, at 154-55. "Grub" was a Shakespeare equivalent of "Caterpillar." WILLIAM SHAKESPEARE, *THE TRAGEDY OF CORIOLANUS* act 5, sc. 4, line 12.

169. See OGBURN, *supra* note 2, at 390-93 (advancing a similar argument).

170. Email from Stephanie Hughes, Editor, *OXFORDIAN*, to Ward E.Y. Elliott (Jan. 8, 2000) (on file with author).

171. Shahan, *supra* note 74, at 154. Oxfordians have argued, in effect, that Shakespeare had a Blue Period, exemplified, for example, by Oxford's "Who taught thee first to sigh, alas, my heart?," poem Number Fifteen, see May, *supra* note 9, at 37, and a *Guernica* period, exemplified by *Venus and Adonis* (1593), *The Rape of Lucrece* (1594), and the *Sonnets* (1590s-1600s). But see Terry Ross, *The Verse Forms of Shakespeare and Oxford*, at <http://shakespeareauthorship.com/verform.html> (last visited Jan. 21, 2005) (questioning the adequacy of this type of argument with respect to these and other poems). But the argument weakens when one examines the actual timing. Picasso's Blue Period ran from 1901 to 1904, when he was in his early twenties, and his Blue work, while far distant in style from what came later, was still manifestly the work of a master. Unlike Oxford's "help fish, help fowl" lines, poem Number Four, see May, *supra* note 9, at 28, *The Old Guitarrist* could never be described as a stumbling, apprentice work. By the time he did *Guernica*, in 1937 at fifty-six, Picasso had not done anything blue, good or bad, for thirty-three years. By contrast, Oxford's great leap to stylistic maturity and master-level work, if there was one, had to take place in his mid-forties and virtually overnight, another case of drastically punctuated evolution, from stumbling baby

Such arguments that differences, no less than similarities, can help prove common authorship—or at least stave off disproof—are hard to refute directly. Certainly there is no shortage of differences in Oxford's case. By some estimates (other than Steven May's), Oxford could have been as young as fifteen when he wrote the eight poems eventually published in the 1576 work, *The Paradyse of Daynty Deuises*. Any or all of them could be song lyrics, not poems proper, and, hence, not suitable for comparison with poems. Terry Ross has noted that more than half of Oxford's known poems are in meters not found in the Shakespeare Canon.<sup>172</sup> Only one of his poems, "Who taught thee first to sigh, alas, my heart?"<sup>173</sup> is a sonnet, and even that has an "echo" found nowhere in Shakespeare.<sup>174</sup> None of his poems are in blank verse, Shakespeare's favorite verse form, or "rhyme royal" (ababbcc seven-line iambic pentameter (I-7)), the form used in *The Rape of Lucrece*.<sup>175</sup> Strictly speaking, only four of Oxford's sixteen poems<sup>176</sup> match anything in Shakespeare's known work (*Venus and Adonis*). Stated differently, two-thirds of Oxford's known verse has no structural parallel at all in Shakespeare; the other third matches no more than 2-4% of Shakespeare's verse. In structural terms, the two poets have as much in common as Picasso's 1903 *The Old Guitarist* and his 1937 *Guernica*.

What could more firmly demonstrate Oxford's primitiveness and lack of suitability for comparison with the mature Shakespeare? If one wanted a clincher, one could do what we almost never admit to doing—not just crunch

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steps in 1593 to practiced giant's strides afterward.

It is worth mentioning that, in response to 1990 Oxfordian assertions of the grub-butterfly argument, we did try out our then-new modal test (which Oxford had failed badly then, as later) on two other writers with large, firmly dated bodies of poetry: Milton and Spenser. Milton's earliest poems (before 1633) and his later poem, *Samson Agonistes* (1670-71), both fit within a profile set by *Paradise Lost* (1658-65). Spenser's *Epigrams and Sonnets* (1569) and his *Amoretti* (1595) closely matched his *Shepherd's Calendar* (1579), but his *Faerie Queene* (1590, 1598) tested very distant from the other four works mentioned. One might expect this result because Spenser took pains to write it in a contrived, archaic style as different on its face from the rest of his poems as the French passages in *Henry V* are from the rest of Shakespeare's plays. See Elliott & Valenza, *Reply to John Shahan*, *supra* note 74, at 157-58. "As far as we can tell from these improvised tests [which used Shakespeare-optimized keywords, not keywords optimized for Milton or Spenser], Milton was a butterfly all his life, and so was Spenser—except when he wrote the *Faerie Queene*." Elliott & Valenza, *A Touchstone for the Bard*, *supra* note 92, at 206.

172. See Ross, *supra* note 171.

173. May, *supra* note 9, at 37 (poem Number Fifteen).

174. Ross, *supra* note 171.

175. *Id.*

176. May, *supra* note 9 (poems Six, Nine, Ten, and Twelve).

Oxford's poems, but actually read them. Consider, for example, this passage from Oxford:

Helpe gods, helpe, saintes, helpe sprites and powers, that in the  
heaven doo dwell,  
Helpe ye that are to waile aye woent, ye howling hounds of hell;  
Helpe man, helpe beastes, helpe birds and wormes, that on the  
earth doth [sic] toile,  
Helpe fishe, helpe foule, that flockes [sic] and feedes [sic] upon the salte sea  
soil;  
Helpe eccho that in ayre dooth flee, shrill voices to resound,  
To waile this losse of my good name, as of these greefes the  
ground.  
FINIS E.O.<sup>177</sup>

Contrast this with Shakespeare's treatment of the same subject—loss of good name:

Know, my name is lost,  
By treason's tooth bare-gnawn and canker-bit . . .<sup>178</sup>

How could anyone suppose that the two passages were written by the same person? We seldom rely on such comparisons because the texts (just like Louis Bénézet's) are seldom selected at random, but more often are chosen to illustrate whatever point the writer is trying to make. Bénézet chose for similarity with Shakespeare; we chose for contrast. In this case, the evidence is exactly opposite to Bénézet's. The styles seem to be worlds apart, with Shakespeare's manifestly more polished and mature. Shakespeare managed to capture in eleven tight, vivid, lapidary words of iambic pentameter much the same thought that took the struggling young Oxford seventy-nine sprawling, repetitious, overwrought, ungrammatical words of rhyme royal to convey.<sup>179</sup> But Oxfordians like Ogburn drew the same conclusion from the apparent

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177. *Id.* at 28 (poem Number Four).

178. WILLIAM SHAKESPEARE, *THE TRAGEDY OF KING LEAR* act 5, sc. 3, lines 122-23.

179. The Oxford passage has three further stylistic quirks that we suspect distinguishes him from Shakespeare: (1) his wailfulness, (2) his occasional odd combination of plural subject and singular verb, and (3) his heavy doses of alliteration. We have spot-checked these against the first 3,000 words of *Venus and Adonis* and found perhaps ten times as many wailful passages in our Oxford baseline as in Shakespeare, twice as much alliteration, and three instances of plural subject, singular verb. We found no such plural-subject/singular-verb usage in the *Venus and Adonis* block but would be interested if Oxfordians could find any such examples elsewhere in Shakespeare. This evidence is no more than suggestive because alliteration and wailfulness are not always easy to count and because we have compared Oxford's work to only one of our fourteen Shakespeare poem blocks. But if differences from Shakespeare help prove common authorship, under the grub-butterfly argument, the pickings for Oxfordians could be very, very rich, especially the articles by Alan Nelson and Steven May mentioned in these pages.

stylistic mismatch that they once drew from a perceived stylistic match; the very immaturity of Oxford's writing is evidence that Shakespeare therefore might have been Oxford after all, only grown-up. If you unconditionally accept the premise that the young Shakespeare must have been a grub, Oxford's many and great differences from Shakespeare do not damage his claim to be the True Shakespeare at all. On the contrary, they support the claim by showing that the young Oxford looks every bit the journeyman grub that the True Young Shakespeare must have been.

But there are serious problems with this argument. One is that, even more than the current farfetched Oxfordian play dating, this argument is pulled from a hat and rests not on any actual evidence on the record, but on the hope that the jury would take judicial notice of a wholly conjectural, and to us wildly improbable, scenario. Oxfordian John Shahan came all too close to the essence of this problem when he reproached us for our fancied resemblance to the drunk who cannot find his keys, looks for them under a streetlight, and explains to a passerby, "I don't know where I lost them . . . [b]ut this is where the light is."<sup>180</sup> If looking where the light is amounts to a sin, we and Alan Nelson and Steven May, along with the longstanding Oxford skeptics, Irvin Matus, Terry Ross, and David Kathman, are the greatest of sinners. Indeed, we are worse sinners than the others for using all that fancy night-vision gear so scorned by lit-department technophobes. However, our tests do help you see where the light would otherwise be dim.

By the light of the documents, Shakespeare looks much more like the Stratford man than the Earl of Oxford. Oxford's poems do not scan like Shakespeare's nor sound like Shakespeare's. By the numbers, Oxford's poems are in a different galaxy from Shakespeare's, and they show no signs of testable stylistic change from his earliest poems at age twenty-two or earlier to his latest, at age forty-four. Unlike the young Mozart or the young Picasso, Oxford tests like a grub (and, to us, sounds like a grub) from beginning to end, showing no stylistic changes at all on any of our tests. If he abruptly leapt from a distant galaxy into Shakespeare's infield and morphed from a caterpillar into a butterfly the very year he adopted the name Shakespeare in 1593, it would be an extraordinary case of what Stephen Jay Gould calls "punctuated development,"<sup>181</sup> not just in one of his previously-frozen stylistic habits, but in seven of them at once. This number would increase to nine, if we count the two close-call tests, where what we know about Oxford is a mismatch with only 94% of what we know about Shakespeare, not the 95-100% we required for a full rejection. It would be, beyond doubt, the grandmother of all mid-life crises. What jury would believe it without sufficient evidence, especially if six out of the nine changed habits froze

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180. Shahan, *supra* note 73, at 164.

181. See generally STEPHEN JAY GOULD, *THE STRUCTURE OF EVOLUTIONARY THEORY* (2002) (arguing that under his theory of punctuated equilibria, evolutionary trends do not result from gradual transformations but from rapid spurts of evolutionary development).



immediately into fixed new profiles for the rest of Shakespeare's life, and the three that continued to change went on doing so for years after Oxford's death? Under the streetlight, Oxford was a caterpillar from beginning to end, and Shakespeare was a butterfly, as different from Oxford as the Beatles were from Vic Damone.

Finally, even if a few ounces of discrepancy could enhance a claim for common authorship, it does not follow that a ton of it would make the claim even stronger. The grub defense does two awkward things for the Oxford claim: (1) it applies equally to other older-generation Shakespeare claimants, such as Sir Edward Dyer, and (2) it marks a huge tacit shift from Louis Bénézet's old-line Oxfordian arguments that Oxford and Shakespeare were stylistic look-alikes. The new Oxfordian argument is that maybe they were not stylistic look-alikes at all, but it does not matter because Oxford might easily have grown into a look-alike. What counts is no longer what Oxford wrote, which you can see all too clearly in the lamplight, but how his life experiences (the very ones that Alan Nelson and Steven May, the world's leaders in Oxford documents, say are mismatches) compared to those depicted in Shakespeare.

As noted in Part II, we have generally stayed out of such controversies, which fall under the heading of conventional, literary, and historical "smoking-gun" evidence. But surely the net effect of the grub parry is to move the defendant, Oxford, out of the category of "testable" claimants like Marlowe, who have actually written something legitimately comparable to Shakespeare. As a grub-designate, Oxford falls instead into the category of "untestable" claimants like the Rosicrucians and the Earls of Derby and Rutland, from whom no poems or plays have survived. No amount of stylometric testing can confirm or deny claims based on what the untestable claimant *might* have written. But such claims, absent any comparable supporting writing, seem far more speculative than those of the despised William Shakspeare of Stratford.

Unlike Alan Nelson, Steven May, and the three named Oxford skeptics, we have done nothing to prove directly that William Shakspeare wrote the plays printed under William Shakespeare's name. Instead, we have brought forward strong statistical evidence that the claims of the Earl of Oxford and the other claimants we tested are astronomically improbable. How this might withstand strong, contrary documentary evidence—if there were any—can only be imagined. Late in the Tennessee symposium, moderator Judy Cornett asked the panelists what kind of hypothetical evidence they would consider irrefutable. Everyone answered "a manuscript," except Elliott, the incorrigible smoking-gun skeptic, who facetiously (and anachronistically because notaries did not exist in Shakespeare's time) suggested a signed, sealed, sworn, notarized affidavit by Shakespeare that either he or some other named party wrote the plays. If such a document materialized, would it be irrefutable? What if it named Mark Twain or the Pope as the "True Author"? Would anyone believe it? What if it named William Shakspeare of Stratford as the True Author? Would any Oxfordian believe it? Or would they see in it fresh

evidence of the virulence of the conspiracy to hide the True Author, adding, if rightly understood, yet another conspiracy-confirming ornament to their Christmas tree? We would not bet against it. We remain mindful of Llewellyn's talk of thrusts and parries, and we suspect that the wait for conclusive, smoking-gun documentary evidence to settle this dispute will be a long one.

#### IV. CONCLUSIONS

In the meantime, we have chosen to cast down our buckets where we are and pay attention to what you can see under the streetlight. We would urge the same to any court or individual trying Oxford or anyone else for being the True Shakespeare. Surely the contours of what we know about Shakespeare and Oxford should be well considered before we venture too deeply into speculation about what we do not know. What we know of them from external evidence, from the two leading Oxford documents scholars in the world, is that they do not match. What we know just from looking at Oxford's poems is that they do not match Shakespeare's. Oxford used different metrical structures, different rhyme schemes, different imagery. On a cursory reading and scanning of their respective poems and on the numbers, our tests clearly show that Oxford and Shakespeare are light years apart. The odds that either could have written the other's work by chance are much lower than the odds of getting hit by lightning. Oxfordian efforts to fix discrepancies by pulling new, older dates for the plays out of a hat have not helped. Nor has the Oxfordian's heroic, unsubstantiated conjecture of Oxford's nine great stylistic mid-life leaps from a distant frozen galaxy right into Shakespeare's ballpark at a single bound helped Oxford's case. The thought of anyone making so many intergalactic conjectural leaps in a single year seems wildly implausible compared to whatever conjectural leaps are required to take the Stratford case seriously—such as the notion that, being legally entitled to do so, the young Shakespeare might actually have attended the Stratford grammar school. It is hard to imagine any jury buying the Oxfordians' colossal mid-life crisis argument without much more substantiation than it has received. In the end, the grub to the butterfly argument remains too grossly at odds with what you can see, all too plainly, under the streetlight: far too many things “don't fit” for Oxford to be a plausible claimant. We would acquit.

## APPENDICES

APPENDIX ONE	PLAY DISCRIMINATION SUMMARIES
APPENDIX TWO	THREE ROUND PLAY TEST SUMMARIES
APPENDIX THREE	ROUND ONE PLAY TESTS
APPENDIX FOUR	ROUND TWO PLAY TESTS
APPENDIX FIVE	ROUND THREE PLAY TESTS
APPENDIX SIX	3,000-WORD POEM & PLAY VERSE TESTS
APPENDIX SEVEN	1,500-WORD POEM & PLAY VERSE TESTS
APPENDIX EIGHT	750-WORD POEM & PLAY VERSE TESTS
APPENDIX NINE	470-WORD POEM TESTS
APPENDIX TEN	CHRONOLOGICAL INDICATORS IN SHAKESPEARE PLAYS

# APPENDIX ONE: KEY TO OVERALL PLAY DISCRIMINATION SUMMARIES

Column Heading	Meaning	Shakespeare Profiles*
Play	Long title of play.	
Short Title	Short title of play.	
Date	Latest supposed date of composition.	
Number of Words	Number of words in play.	
Discrete Rejections	Number of Shakespeare rejections in 46 to 48 tests.	0 to 2
Discrete Composite Probability	Mathematical probability that the observed number of rejections would occur by chance at Shakespeare's baseline rejection rate. Profile minimum, right, is for Shakespeare's most discrepant block.	>2.316E-01
Continuous Composite Probability	Mathematical probability that observed continuous composite error would occur by chance. Profile minimum, right is for Shakespeare's most discrepant, least probable block. See text.	>3.6895E-03
Highlighting Conventions	The right three columns of Appendix One show composite results only and are shaded yellow = composite. Outliers—that is, <i>rejections</i> for plays in the Shakespeare baseline, <i>non-rejections</i> for all others—are highlighted in red or gray. That is, for Shakespeare baseline: Red or gray = <i>outside</i> Shakespeare profile. For all others: Red or gray = <i>inside</i> Shakespeare profile. See text.	* Composite Shakespeare profiles may also be found at the bottom of most tables in the Appendices.

## SUMMARY OF RESULTS

*Individual Discrete Rejections:* Of 29 plays in our Shakespeare core baseline, only 7 have as many as 2 “discrete” Shakespeare rejections in 48 individual tests. Of 51 plays by Shakespeare claimants, none has fewer than 10 Shakespeare rejections. Of 27 plays in the Shakespeare Apocrypha, none has fewer than 7 rejections.

*Discrete and Continuous Composite Rejection Scores:* By either of these scoring systems, all of the Claimant and Apocrypha plays are many orders of magnitude less likely to have been written by Shakespeare solo than any Shakespeare baseline play (see text and Key to Table Two). No play in the Shakespeare core baseline has even one rejection by any of the three composite tests used. No red- or gray-shaded anomalies are found in any of the baseline Shakespeare, Claimant, or Apocrypha plays tested.

*Dubitanda and Set-asides:* The only red or gray shading anywhere in Appendix One is found, unsurprisingly, in the Shakespeare Dubitanda and set-aside section, which consists of plays which Shakespeare is suspected of co-authoring. Most of these selections, including several conventionally ascribed to Shakespeare, also seem very distant from Shakespeare. These look co-authored or other-authored. But a few are only slightly outside Shakespeare's composite boundaries. These could well be by him alone or almost alone: *2H6*; *H5*; *Per* (3-5); and maybe *STM* (*Sh*) fall into this category.

# Appendix One (Shakespeare): Core Shakespeare Play Baseline Discrimination Summaries

Play	Short Title	Latest Supposed Date	Number of Words	Discrete Rejections	Discrete Composite Probability	Continuous Composite Probability
Richard III	R3	1593	28473	0	1.000E+00	8.9791E-01
The Taming of the Shrew (c)	Shr	1594	20496	1	6.018E-01	4.4275E-01
Two Gentlemen of Verona (c)	TGV	1594	16952	1	6.018E-01	6.2283E-02
The Comedy of Errors (c)	Err	1594	14438	1	6.018E-01	4.2266E-01
Richard II	R2	1595	21896	2	2.316E-01	3.3822E-02
Love's Labor's Lost (c)	LLL	1595	21168	2	2.316E-01	4.2905E-01
King John	Jn	1596	20462	0	1.000E+00	1.3478E-01
A Midsummer Night's Dream	MND	1596	16164	2	2.316E-01	6.7391E-01
Romeo and Juliet	Rom	1596	24070	0	1.000E+00	9.9445E-01
Henry IV, Part I	1H4	1597	24140	1	6.018E-01	9.5223E-01
The Merry Wives of Windsor	Wiv	1597	21279	2	2.316E-01	1.2563E-02
The Merchant of Venice	MoV	1597	21002	1	6.018E-01	9.0359E-01
Henry IV, Part II	2H4	1598	25829	1	6.018E-01	6.1270E-01
Julius Caesar	JC	1599	19187	1	6.018E-01	4.6432E-01
Much Ado About Nothing (c)	Ado	1599	20861	1	6.018E-01	9.9880E-03
As You Like It (c)	AYL	1599	21381	2	2.316E-01	3.9824E-01
Hamlet	Ham	1601	29673	2	2.316E-01	5.0606E-02
Twelfth Night (c)	TN	1602	19493	1	6.018E-01	6.8504E-01
Troilus and Cressida	Tro	1602	25640	0	1.000E+00	8.4691E-01
Measure for Measure	MFM	1603	21361	0	1.000E+00	9.6541E-01
All's Well That Ends Well (c)	AWW	1603	22585	0	1.000E+00	8.8350E-01
Othello	Oth	1604	25982	1	6.018E-01	2.9374E-01
King Lear	Lr	1605	25371	0	1.000E+00	9.0747E-01
Macbeth	Mac	1606	16194	1	6.018E-01	5.3985E-01
Anthony and Cleopatra	Ant	1607	23815	0	1.000E+00	9.5866E-01
Coriolanus	Cor	1608	26639	1	6.018E-01	4.2183E-01
Cymbeline	Cym	1610	26861	1	6.018E-01	9.9501E-01
The Tempest	Tmp	1611	16149	2	2.316E-01	3.6895E-03
A Winter's Tale	WT	1611	24680	0	1.000E+00	9.7333E-01
<i>Shakespeare Core Profile Bounds</i>				2	2.316E-01	3.6895E-03

Note : (c) indicates light comedy

*Summary of Results* . None of our 29 core Shakespeare plays has more than two rejections in 48 tests or scores outside either of our composite probability ranges. No claimant play or Shakespeare Apocrypha play has fewer than seven rejections or scores anywhere near our composite probability ranges. Results for our Shakespeare dubitanda and set-asides are not so clear, possibly because co-authored passages have not been completely separated, and probably also because some samples are too short and variable for standards based on whole, presumptively single-authored plays. Some Dubitanda samples are closer to Shakespeare than others, but most show some sign of joint authorship.

Appendix One (Claimants) -- Claimant Play Discrimination Summaries

Playwright	Play	Short Title	Latest Supposed Date	Number of Words	Discrete Rejections	Discrete Composite Probability	Continuous Composite Probability
<i>Shakespeare Core Profile Bounds</i>					2	2.316E-01	3.6895E-03
Beaumont, Francis*	The Knight of the Burning Pestle	PESL	1607	21006	16	<1.000E-15	<1.0000E-15
Chapman, George*	The Gentleman Usher	USHR	1602	20956	15	8.438E-15	<1.0000E-15
Chapman, George*	Bussy D'Ambois	BUSS	1607	19787	16	<1.000E-15	<1.0000E-15
Daniel, Samuel	Cleopatra	CLEO	1593	13612	18	<1.000E-15	<1.0000E-15
Dekker, Thomas	The Whore of Babylon	WBAB	1607	20267	18	<1.000E-15	<1.0000E-15
Dekker, Thomas	Honest Whore	HNWR	1608	23240	19	<1.000E-15	<1.0000E-15
Fletcher, John	The Woman's Prize	WPRZ	1604	22983	14	2.092E-13	<1.0000E-15
Fletcher, John	Valentinian	VALN	1610	24634	13	2.380E-12	<1.0000E-15
Fletcher, John	Monsieur Thomas	MTOM	1616	20238	13	4.355E-12	<1.0000E-15
Fletcher, John	Chances	CHNC	1617	16211	18	<1.000E-15	<1.0000E-15
Fletcher, John	The Loyal Subject	LOYL	1618	25458	20	<1.000E-15	<1.0000E-15
Fletcher, John	Demetrius and Enanthe	DEMT	1619	24130	14	1.075E-13	<1.0000E-15
Fletcher, John	Sir J.V.O. Barnavelt	BARN	1619	21537	13	2.380E-12	<1.0000E-15
Fletcher, John	The Island Princess	ISLN	1619	22483	19	<1.000E-15	<1.0000E-15
Greene, Robert	Alphonsus	ALPH	1587	15072	19	<1.000E-15	<1.0000E-15
Greene, Robert	Friar Bacon & Friar Bungay	FBFB	1591	16227	19	<1.000E-15	<1.0000E-15
Greene, Robert	James IV	JAM4	1591	19872	16	<1.000E-15	8.3495E-15
Heywood, Thomas	A Woman Killed with Kindness	HEYW	1603	16242	11	1.376E-09	1.6337E-06
Jonson, Ben	Sejanus	SEJA	1603	25954	13	4.355E-12	<1.0000E-15
Jonson, Ben	Volpone	VOLP	1606	26528	13	4.355E-12	<1.0000E-15
Jonson, Ben	The Alchemist	ALCH	1610	26944	18	<1.000E-15	<1.0000E-15
Jonson, Ben	Bartholomew Fair	BART	1614	35859	17	<1.000E-15	<1.0000E-15
Jonson, Ben	The New Inn	NINN	1629	22028	14	2.092E-13	<1.0000E-15
Jonson, Ben	A Tale of a Tub	TTUB	1633	8315	22	<1.000E-15	<1.0000E-15
Kyd, Thomas	The Spanish Tragedy	SPTR	1589	20316	17	<1.000E-15	<1.0000E-15
Lyly, John	The Woman in the Moon	LYWM	1597	12300	21	<1.000E-15	<1.0000E-15
Marlowe, Christopher	Tamburlaine	TAM1	1588	17205	26	<1.000E-15	<1.0000E-15
Marlowe, Christopher	Tamburlaine, pt. 2	TAM2	1588	18122	21	<1.000E-15	<1.0000E-15
Marlowe, Christopher	Doctor Faustus, 1616	DF16	1588	16140	11	1.376E-09	<1.0000E-15
Marlowe, Christopher	The Jew of Malta	JEWM	1589	17994	13	4.355E-12	<1.0000E-15
Marlowe, Christopher	Edward II	EDW2	1592	21104	10	1.337E-08	1.2780E-07
Marlowe, Christopher	The Massacre at Paris	MAPA	1593	10353	14	1.075E-13	<1.0000E-15
Marlowe, Christopher	Dido, Queen of Carthage	DIDO	1586	13726	19	<1.000E-15	<1.0000E-15
Middleton, Thomas	The Phoenix	PHOE	1604	19347	13	4.355E-12	<1.0000E-15
Middleton, Thomas	Michaelmas Term	MICL	1606	19357	20	<1.000E-15	<1.0000E-15
Middleton, Thomas	A Chaste Maid Cheapside	CHST	1611	16906	22	<1.000E-15	<1.0000E-15
Middleton, Thomas	No Wit Like a Woman's	NWIT	1613	25463	17	<1.000E-15	<1.0000E-15
Middleton, Thomas	More Dissemblers	MDIS	1615	18845	21	<1.000E-15	<1.0000E-15
Middleton, Thomas	The Witch	WITC	1616	15859	18	<1.000E-15	<1.0000E-15
Middleton, Thomas	Hengist/Mayor of Queenboro	HENG	1618	19507	13	4.355E-12	<1.0000E-15
Middleton, Thomas	Women Beware Women	WBWM	1621	25135	18	<1.000E-15	<1.0000E-15
Middleton, Thomas	A Game at Chess	GAME	1624	17670	18	<1.000E-15	<1.0000E-15
Munday, Anthony	John a Kent and John a Cumber	JKJC	1594	13412	14	2.092E-13	1.1574E-10
Nashe, Thomas	Will Summer's Last Will & Testa	WILL	1592	16577	15	8.438E-15	<1.0000E-15
Peele, George	The Arraignment of Paris	ARPA	1584	10209	19	<1.000E-15	<1.0000E-15
Peele, George	David and Bethsabe	DBET	1594	14748	23	<1.000E-15	<1.0000E-15
Pickering, John	Horestes	HORE	1567	11841	17	<1.000E-15	<1.0000E-15

# Appendix One (Claimants) -- Claimant Play Discrimination Summaries

Playwright	Play	Short Title	Latest Supposed Date	Number of Words	Discrete Rejections	Discrete Composite Probability	Continuous Composite Probability
<i>Shakespeare Core Profile Bounds</i>					2	2.316E-01	3.6895E-03
Porter, Henry	Two Angry Women of Abingdon	ANWO	1598	25473	17	<1.000E-15	<1.0000E-15
Sidney Herbert, Mary	Antonius (extract)	ANTO	1590	2234	29	<1.000E-15	<1.0000E-15
Smith, Wm. (Wentworth)	The Hector of Germany	HECT	1615	15224	10	2.072E-08	8.1949E-15
Wilson, Robert	Three Ladies of London	3LDY	1581	16949	12	4.724E-11	4.3662E-07
<i>Discrimination Summary</i>							
Non-Shakespeare discrete rejections mean					17		
Rejections of 51 plays tested					51	51	51
Rejection percentage					100	100	100

\*Note : Beaumont and Chapman are not claimants; all others are.

Yellow indicates a composite score or standard.

*Summary of Results* . No claimant play play has fewer than ten rejections or scores anywhere near our composite Shakespeare probability ranges, either by discrete or by continuous testing.

# Appendix One (Apocrypha) --Shakespeare Dubitanda and Apocrypha Play Discrimination Summaries

Play	Short Title	Latest Supposed Date	Number of Words	Discrete Rejections	Discrete Composite Probability	Continuous Composite Probability
<i>Shakespeare Core Profile Bounds</i>				2	2.316E-01	3.6895E-03
<i>Dubitanda and set-asides</i>						
Henry VI, Part I	1H6	1590	20595	11	1.376E-09	<1.0000E-15
Henry VI, Part 2	2H6	1591	24533	3	6.309E-02	2.724E-01
Henry VI, Part 3	3H6	1591	23402	8	3.252E-06	3.411E-07
Henry V	H5	1599	25788	2	2.316E-01	3.258E-11
Henry VIII (Fletcher's part)	H8, (Fl)	1613	7158	15	8.438E-15	<1.0000E-15
Henry VIII (joint part)	H8, (Jt)	1613	3986	18	<1.000E-15	<1.0000E-15
Henry VIII (Shakespeare's part)	H8, (Sh)	1613	11953	9	2.768E-07	5.234E-07
Pericles, Acts 1-2	Per, 1-2	1608	7839	15	8.438E-15	<1.0000E-15
Pericles, Acts 3-5	Per (3-5)	1608	9907	3	6.309E-02	6.864E-03
Timon of Athens	Tim	1608	17704	13	4.355E-12	<1.0000E-15
Two Noble Kinsmen (Fletcher's part)	TNK (Fl)	1613	14668	17	<1.000E-15	<1.0000E-15
Two Noble Kinsmen (Sh's part)	TNK (Sh)	1613	14528	4	1.305E-02	4.207E-06
Titus Andronicus	Tit.	1594	19835	7	3.323E-05	1.840E-05
Titus Andronicus, early stratum	Tit early	1594	10609	15	8.438E-15	<1.0000E-15
Titus Andronicus, late stratum	Tit late	1594	7789	9	2.768E-07	2.267E-08
Sir Thomas More (Sh's part)	STM (Sh)	1595	1382	21	<1.000E-15	<1.0000E-15
<i>Discrimination Summary</i>						
Non-Shakespeare discrete rejections mean				11		
Rejections of 16 works tested				15	15	14
Rejection percentage				94	94	88
<i>Apocrypha</i>						
Horestes	HORE	1567	11841	17	<1.000E-15	<1.0000E-15
Famous Victories of Henry V	FVH5	1588	12496	16	<1.000E-15	<1.0000E-15
Taming of a Shrew	TOAS	1589	12214	15	8.438E-15	<1.0000E-15
Ironside	IRON	1590	15037	12	8.165E-11	<1.0000E-15
Arden of Feversham	ARDN	1592	19453	10	2.072E-08	5.316E-14
Contention of York, Part 1	YRK1	1592	16149	14	2.092E-13	3.060E-10
Contention of York, Part 2	YRK2	1592	17011	17	<1.000E-15	<1.0000E-15
Guy of Warwick	GUYW	1593	12731	19	<1.000E-15	<1.0000E-15
Leir	LEIR	1594	21062	8	3.252E-06	<1.0000E-15
Richard III	RCD3	1594	19506	15	8.438E-15	<1.0000E-15
Sir Thomas More	STMO	1595	19509	7	3.323E-05	<1.0000E-15
Edward III	EDW3	1595	19395	13	4.355E-12	2.639E-12
King John, Part 1	KJN1	1595	14141	14	2.092E-13	2.063E-11
King John, Part 2	KJN2	1595	9646	16	<1.000E-15	1.504E-09
Locrine	LOCR	1595	15440	22	<1.000E-15	<1.0000E-15
Woodstock	WOOD	1595	25009	20	<1.000E-15	<1.0000E-15
Mucedorus	MUCE	1598	11739	11	1.376E-09	<1.0000E-15
Sir John Oldcastle	OLDC	1600	20823	11	1.376E-09	4.862E-10
Lord Thomas Cromwell	CROM	1602	13866	13	4.355E-12	3.365E-11
The Merry Devil of Edmonton	DEVL	1604	11588	11	1.376E-09	<1.0000E-15
The London Prodigal	PROD	1605	15656	16	<1.000E-15	<1.0000E-15
The Puritan	PURN	1607	18477	19	<1.000E-15	<1.0000E-15



# Appendix One (Apocrypha) --Shakespeare Dubitanda and Apocrypha Play Discrimination Summaries

Play	Short Title	Latest Supposed Date	Number of Words	Discrete Rejections	Discrete Composite Probability	Continuous Composite Probability
<i>Shakespeare Core Profile Bounds</i>				2	2.316E-01	3.6895E-03
A Yorkshire Tragedy	YKSH	1608	5722	14	2.092E-13	<1.0000E-15
The Second Maiden's Tragedy	MAID	1611	18454	22	<1.000E-15	<1.0000E-15
Double Falsehood	FALS	1613	15429	11	1.376E-09	<1.0000E-15
Faire Em	FAIR	1631	11529	22	<1.000E-15	<1.0000E-15
The Birth of Merlin	MERL	1631	18393	11	1.376E-09	<1.0000E-15
The Revenger's Tragedy*	RVGR	1606	19690	19	<1.000E-15	<1.0000E-15
<i>Discrimination Summary</i>						
Non-Shakespeare Discrete Rejections Mean				15		
Rejections of 28 works tested				28	28	28
Rejection percentage				100	100	100

\**The Revenger's Tragedy* is not considered part of the Shakespeare Apocrypha; the others are.

Yellow shading indicates a composite score or standard.

Gray shading indicates a discrete rejection count that unexpectedly lies *inside* of the designated Shakespeare rejection profile.

Red shading indicates a value that unexpectedly lies *inside* of the designated Shakespeare probabilities profile.

*Summary of Results* . All 27 Apocrypha plays, and *The Revenger's Tragedy* fall decisively outside Shakespeare's profile. Most of our Shakespeare dubitanda and set-asides show some signs of co- or other-authorship. Dubitanda results are less conclusive than results for Claimants and Apocrypha, probably because the passages are, in fact, co-authored or other-authored and the other author's work not perfectly segregated from Shakespeare's. Some samples, such as STM Sh and H8 (jt) are too short and variable for composite rejections based on whole, presumptively single-authored plays to mean much.

## APPENDIX TWO: KEY TO 3-ROUND PLAY TEST SUMMARIES

Column Heading	Meaning	Shakespeare Profiles
Play	Short title of play.	
Date	Latest supposed date of composition.	
Discrete Rejections	Number of Shakespeare rejections in up to 48 tests.	0 to 2
Discrete Rejection Rate	Percentage of Shakespeare (Sh.) rejections (here 27) of all observed test scores on Shakespeare baseline (here 1,392).	1.9%
Discrete Composite Probability	Abstract probability that the observed number of rejections would occur by chance at Shakespeare's baseline rejection rate. Profile minimum shown at right is measured for Shakespeare's most discrepant, least probable block.	>2.316E-01
Continuous Composite Error	Composite distance from composite mean on every test. See text.	
Continuous Composite Probability	Abstract probability that observed continuous composite error would occur by chance. Profile minimum at right is measured for Shakespeare's most discrepant, least probable block. See text.	>3.6895E-03
Relative Shakespeare Probability	Shakespeare's minimum Composite Probability score (see Shakespeare profiles, right column) divided by sample text's Composite Probability score.	>1.0
Highlighting Conventions	Individual tests for all: no highlight = no rejection, inside Sh. profile. aqua = rejection, outside profile. Composite results for all: yellow = composite, not individual, score. For Sh. base: Red or gray = <i>outside</i> Sh. profile, unexpected comp. rejection. For all others: Red or gray = <i>inside</i> Sh. profile, unexpected non-rejection	

### SUMMARY OF RESULTS

*Simple Rejections:* Of 29 plays in our Shakespeare core baseline, only 7 have as many as 2 Shakespeare rejections in 48 tests. Of 51 plays by Shakespeare claimants, none has fewer than 10 Shakespeare rejections. Of 27 plays in the Shakespeare Apocrypha, none has fewer than 7 rejections.

*Relative Discrete Rejection Odds:* The odds of 7 rejections taking place by chance, at Shakespeare's average baseline rejection rate— $3.323 \times 10^{-5}$ —are almost 7,000 times lower than the odds for Shakespeare's own most discrepant baseline plays— $2.316 \times 10^{-1}$ . The odds of 10 rejections are 11 million times lower.

*Relative Continuous Rejection Odds:* The closest claimant play to Shakespeare by this test is HEYW, with a continuous composite probability (CCP) of  $1.6337 \times 10^{-6}$ .  $1.6337 \times 10^{-6}$  is 2,255 times lower than Shakespeare's lowest-probability play, *The Tempest*; hence, even HEYW is very unlikely to be by Shakespeare. Forty-nine of the fifty-one Claimant plays tested have CCPs too low to compute,  $<1 \times 10^{-15}$ . Their relative Shakespeare probability, at best, is about 370 billion times lower than that of *The Tempest*.

Shakespeare Play Baseline Data, Three-Round Composite Scores

Play	Round One			Round Two			Round Three			Three-Round Composites			
	Date Late	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Discrete Probability (1.9%)	Continuous Composite Error	Continuous Composite Probability	Continuous Composite Probability
R3	1593	17	0	3.5953	16	0	3.3005	15	0	1.000E+00	6.0037	8.9791E-01	8.9791E-01
Shr (c)	1594	17	0	3.3345	16	0	4.7203	15	1	6.018E-01	6.9820	4.4275E-01	4.4275E-01
TGV (c)	1594	17	1	3.8947	16	0	5.2066	15	0	6.018E-01	7.9920	6.2283E-02	6.2283E-02
Err (c)	1594	17	0	3.5030	16	0	4.1528	15	1	6.018E-01	7.0183	4.2266E-01	4.2266E-01
R2	1595	17	2	6.6600	16	0	3.1157	15	0	2.316E-01	8.2088	3.3822E-02	3.3822E-02
LLL (c)	1595	17	1	5.1498	16	0	2.9145	15	1	2.316E-01	7.0067	4.2905E-01	4.2905E-01
Jn	1596	17	0	4.6784	16	0	4.1794	15	0	1.000E+00	7.6741	1.3478E-01	1.3478E-01
MND (c)	1596	17	1	4.0330	16	1	3.8589	15	0	2.316E-01	6.5642	6.7391E-01	6.7391E-01
Rom	1596	17	0	3.3023	16	0	3.1489	15	0	1.000E+00	5.1721	9.9445E-01	9.9445E-01
IH4	1597	17	0	3.4298	16	1	3.6228	15	0	6.018E-01	5.7385	9.5223E-01	9.5223E-01
Wiv (c)	1597	17	0	5.8133	16	1	5.1059	15	1	2.316E-01	8.5182	1.2563E-02	1.2563E-02
MoV	1597	17	1	4.5201	16	0	2.4490	15	0	6.018E-01	5.9818	9.0359E-01	9.0359E-01
2H4	1598	17	0	2.4853	16	0	4.9191	15	1	6.018E-01	6.6788	6.1270E-01	6.1270E-01
JC	1599	17	1	4.2579	16	0	3.5154	15	0	6.018E-01	6.9434	4.6432E-01	4.6432E-01
Ado (c)	1599	17	0	5.4200	16	0	4.0941	15	1	6.018E-01	8.5842	9.9880E-03	9.9880E-03
AYL (c)	1599	17	1	4.3377	16	0	4.2498	15	1	2.316E-01	7.0630	3.9824E-01	3.9824E-01
Ham	1601	17	0	3.7082	16	1	5.4376	15	1	2.316E-01	8.0685	5.0606E-02	5.0606E-02
TN (c)	1602	17	0	3.3802	16	0	4.2941	15	1	6.018E-01	6.5426	6.8504E-01	6.8504E-01
Tro	1602	17	0	3.0306	16	0	3.2904	15	0	1.000E+00	6.1705	8.4691E-01	8.4691E-01
MFM	1603	17	0	3.6795	16	0	3.6298	15	0	1.000E+00	5.6393	9.6541E-01	9.6541E-01
AWW (c)	1603	17	0	4.3521	16	0	2.8090	15	0	1.000E+00	6.0557	8.8350E-01	8.8350E-01
Oth	1604	17	1	3.8977	16	0	5.3357	15	0	6.018E-01	7.2667	2.9374E-01	2.9374E-01
Lr	1605	17	0	4.0644	16	0	2.6985	15	0	1.000E+00	5.9663	9.0747E-01	9.0747E-01
Mac	1606	17	0	3.8803	16	0	3.2221	15	1	6.018E-01	6.8095	5.3985E-01	5.3985E-01
Ant	1607	17	0	3.4842	16	0	3.7680	15	0	1.000E+00	5.6932	9.3866E-01	9.3866E-01
Cor	1608	17	0	3.7449	16	1	4.6773	15	0	6.018E-01	7.0198	4.2183E-01	4.2183E-01
Cym	1610	17	0	2.2715	16	0	2.9010	15	1	6.018E-01	5.1483	9.9501E-01	9.9501E-01
Temp	1611	17	1	5.5431	16	1	5.0321	15	0	2.316E-01	8.8520	3.6895E-03	3.6895E-03
WT	1611	17	0	2.7265	16	0	3.6850	15	0	1.000E+00	5.5639	9.7333E-01	9.7333E-01
Aggregates													
Discrete Rejections Percentage				Composite Discrimination Statistics				Composite Discrimination Statistics					
27				2%				27				0	
1,392				1,392				Comp Rej				0%	
												29	

Claimants versus Shakespeare Baseline, Three-Round Composite Scores

Play	Round One				Round Two				Round Three				Three-Round Composites			
	Date Late	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Discrete Composite Probability (1.9%)	Continuous Composite Error	Continuous Composite Probability	Number of Tests	Discrete Rejections	Discrete Composite Probability (1.9%)	Continuous Composite Error
Beaumont: PESL	1607	17	4	6.1509	16	8	10.8081	15	4	5.2840	48	16	<1.000E-15	13.5118	<1.000E-15	<1.000E-15
	Chapman	1602	17	6	7.3403	16	6	7.5246	15	3	18.7230	48	15	8.438E-15	21.4721	<1.000E-15
BUSS	1607	17	5	8.9050	16	9	8.9708	15	2	4.6424	48	16	<1.000E-15	13.4658	<1.000E-15	<1.000E-15
	Daniel: CLEO	1593	17	8	10.2965	16	3	15.8001	15	7	12.3658	48	18	<1.000E-15	22.5516	<1.000E-15
Dekker																
WBAB	1607	17	6	8.4309	16	7	15.5854	15	5	8.8969	48	18	<1.000E-15	19.8278	<1.000E-15	<1.000E-15
HNWR	1608	17	7	9.0618	16	5	30.1334	15	7	6.6256	48	19	<1.000E-15	32.1565	<1.000E-15	<1.000E-15
Fletcher																
WPRZ	1604	17	6	10.7337	16	7	16.6728	15	1	4.7280	48	14	2.092E-13	20.3850	<1.000E-15	<1.000E-15
VALN	1610	15	1	6.2970	16	6	14.8560	15	6	6.4880	46	13	2.380E-12	17.3910	<1.000E-15	<1.000E-15
MTOM	1616	17	7	14.1974	16	4	9.0992	15	2	6.4928	48	13	4.355E-12	18.0698	<1.000E-15	<1.000E-15
CHNC	1617	15	7	10.4537	16	7	15.3766	15	4	6.2723	46	18	<1.000E-15	19.6229	<1.000E-15	<1.000E-15
LOYL	1618	15	8	8.7356	16	8	24.7698	15	4	6.6647	46	20	<1.000E-15	27.0974	<1.000E-15	<1.000E-15
DEMT	1619	15	6	7.8607	16	5	15.9877	15	3	5.4294	46	14	1.075E-13	18.6246	<1.000E-15	<1.000E-15
BARN	1619	15	3	7.0467	16	7	11.8648	15	3	4.9638	46	13	2.380E-12	14.6652	<1.000E-15	<1.000E-15
ISLN	1619	15	7	9.4736	16	8	17.3603	15	4	6.3007	46	19	<1.000E-15	20.7564	<1.000E-15	<1.000E-15
Greene																
ALPH	1587	17	8	10.7996	16	6	29.7590	15	5	18.6488	48	19	<1.000E-15	36.7425	<1.000E-15	<1.000E-15
FBFB	1591	17	9	10.1298	16	3	8.0417	15	7	6.8444	48	16	<1.000E-15	14.6331	<1.000E-15	<1.000E-15
IAM4	1591	17	5	6.1470	16	4	5.3102	15	7	9.9686	48	16	<1.000E-15	12.8591	8.3495E-15	<1.000E-15
Heywood: HEYW	1603	17	3	6.1582	16	6	6.8114	15	2	4.8661	48	11	1.376E-09	10.3922	1.6337E-06	<1.000E-15
Johnson																
SEJA	1603	17	5	7.9935	16	5	6.2245	15	3	9.4478	48	13	4.355E-12	13.8528	<1.000E-15	<1.000E-15
VOLP	1606	17	4	8.1757	16	6	17.4720	15	3	11.2481	48	13	4.355E-12	22.3301	<1.000E-15	<1.000E-15
ALCH	1610	17	6	13.4228	16	6	42.2479	15	6	6.9520	48	18	<1.000E-15	44.8707	<1.000E-15	<1.000E-15
BART	1614	17	5	10.2677	16	8	51.5585	15	4	6.1398	48	17	<1.000E-15	52.9283	<1.000E-15	<1.000E-15
NINN	1629	17	5	13.2870	16	4	29.5448	15	5	5.8452	48	14	2.092E-13	32.9181	<1.000E-15	<1.000E-15
TTUB	1633	17	5	15.7273	16	8	78.7328	15	9	8.0772	48	22	<1.000E-15	80.6935	<1.000E-15	<1.000E-15
Kyd: SPTK	1589	17	8	8.6492	16	2	4.6251	15	7	11.4267	48	17	<1.000E-15	15.0589	<1.000E-15	<1.000E-15
Lyly: LYWM	1597	17	10	10.2884	16	6	5.3508	15	5	6.3417	48	21	<1.000E-15	13.2174	<1.000E-15	<1.000E-15
Marlowe																
TAM1	1588	17	12	12.1162	16	5	5.7899	15	9	10.2345	48	26	<1.000E-15	16.8841	<1.000E-15	<1.000E-15
TAM2	1588	17	11	11.4670	16	4	5.3819	15	6	9.5213	48	21	<1.000E-15	15.8465	<1.000E-15	<1.000E-15
DF16	1588	17	3	6.7075	16	2	10.2607	15	6	11.2148	48	11	1.370E-09	16.6145	<1.000E-15	<1.000E-15
JEWMM	1589	17	2	5.8662	16	5	12.5319	15	6	5.8610	48	13	4.355E-12	15.0271	<1.000E-15	<1.000E-15
EDW2	1592	15	5	5.9676	16	2	5.4556	15	3	6.9311	46	10	1.337E-08	10.6497	1.2780E-07	<1.000E-15
MAPA	1593	15	6	8.0442	16	1	6.8153	15	7	9.0498	46	14	1.075E-13	13.8945	<1.000E-15	<1.000E-15
DIDO	1586	15	10	9.1654	16	3	7.5014	15	6	26.3062	46	19	<1.000E-15	28.8495	<1.000E-15	<1.000E-15
Middleton																
PHOE	1604	17	3	7.8028	16	7	29.1857	15	3	6.8466	48	13	4.355E-12	30.9769	<1.000E-15	<1.000E-15
MICL	1606	17	6	8.6012	16	10	38.8099	15	4	5.7446	48	20	<1.000E-15	40.1645	<1.000E-15	<1.000E-15
CHST	1611	17	7	11.0638	16	11	26.3443	15	4	4.9763	48	22	<1.000E-15	29.0033	<1.000E-15	<1.000E-15
NWIT	1613	17	5	9.6017	16	10	30.5349	15	2	5.1269	48	17	<1.000E-15	32.4170	<1.000E-15	<1.000E-15
MDIS	1615	17	8	8.3443	16	9	27.3168	15	4	7.2850	48	21	<1.000E-15	29.4772	<1.000E-15	<1.000E-15
WITC	1616	17	4	9.3154	16	8	20.1227	15	6	7.2153	48	18	<1.000E-15	23.3186	<1.000E-15	<1.000E-15
HENG	1618	17	3	6.5766	16	7	10.1719	15	3	5.7665	48	13	4.355E-12	13.4154	<1.000E-15	<1.000E-15
WBWM	1621	17	6	8.6944	16	9	28.9607	15	3	5.2429	48	18	<1.000E-15	30.6888	<1.000E-15	<1.000E-15
GAME	1624	17	6	11.4011	16	6	24.0085	15	6	6.7486	48	13	<1.000E-15	27.4215	<1.000E-15	<1.000E-15
Munday: JKC	1594	17	6	7.0042	16	3	6.9902	15	5	6.3440	48	14	2.092E-13	11.7545	<1.000E-15	<1.000E-15

*Claimants versus Shakespeare Baseline, Three-Round Composite Scores*

Round One				Round Two				Round Three				Three-Round Composites			
Play	Date Late	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Continuous Composite Error	Number of Tests	Discrete Rejections	Discrete Composite Probability (1.9%)	Continuous Composite Error	Continuous Composite Probability
Nashe: WILL	1592	17	10	15.0467	16	3	6.2545	15	2	3.8703	48	15	8.438E-15	16.7482	<1.000E-15
Peele															
ARPA	1584	17	11	11.3148	16	2	6.4076	15	6	9.7097	48	19	<1.000E-15	16.2284	<1.000E-15
DBET	1594	17	12	17.3340	16	5	6.0020	15	6	7.2659	48	23	<1.000E-15	19.7303	<1.000E-15
Pickering: HORE	1567	15	6	8.6511	16	5	17.6199	15	6	20.1372	46	17	<1.000E-15	28.1213	<1.000E-15
Porter: ANWO	1598	17	4	10.9344	16	4	15.0509	15	9	8.8210	48	17	<1.000E-15	20.5889	<1.000E-15
Sidney: ANTO	1590	17	16	20.6108	16	6	8.1244	15	7	11.7404	48	29	<1.000E-15	25.0729	<1.000E-15
Smith: HECT	1615	17	4	7.8092	16	3	8.4325	15	3	5.7713	48	10	2.072E-08	12.8607	8.1949E-15
Wilson: 3LDY	1581	15	7	7.9185	16	2	4.1843	15	3	5.4051	46	12	4.724E-11	10.4607	4.3662E-07
Composite Discrimination Statistics															
Aggregates				Discrete Rejections Percentage				Comp Rej				51			
				Blocks Tested								100%			
												51			
Composite Thresholds															
2.316E-01															
3.6895E-03															
Sh Discrete Rejection Profile (See note in key)															
Minimum															
Maximum															
0															
2															

APPENDIX THREE: KEY TO TABLES FOR ROUND ONE PLAY TESTS  
NEW-TECH TESTS, HYPHENATED WORDS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Buckets: G	Semantic buckets score in standard errors from the Shakespeare mean.	-2 to +2
Slope	Thisted-Efron Slope Test score.	-0.13 to +0.06
Rare Words: G	Thisted-Efron Rare Words Test score.	-2 to +89
New Words	Thisted-Efron New Words Test score.	-14 to +5
Grade Level: G, E	Reading grade level score.	4 to 7
Fem Endings: T, P	Percentage of feminine endings of verse lines. All figures are computer counts, which are generally lower and less accurate than manual counts.	Early (to 1597): 8 to 17 mid: ('97-'04): 8 to 20 late: (1605 on) 17 to 22
Open Lines: T, E, P	Percentage of open or run-on verse lines. All figures are computer counts, which are generally comparable to manual counts.	early: 11 to 23 mid: 16 to 32 late: 31 to 50
HC/20K: E	Hyphenated compound words per 20,000 words.	52 to 180
no / (no + not)	Ratio of the number of occurrences of <i>no</i> to that of <i>no</i> plus <i>not</i> combined, times 1000.	242 to 358
it (lws)	Rate of occurrence for <i>it</i> as the last word of a sentence (per 1,000 sentences).	8 to 30
with (2lws)	Rate of occurrence for <i>with</i> as the penultimate word of a sentence (per 1,000 sentences).	9 to 21
it (fw)	Rate of occurrence for <i>it</i> as the first word of a sentence (per 1,000 sentences).	7 to 18
the (2lws)	Rate of occurrence for <i>the</i> as the penultimate word of a sentence (per 1,000 sentences).	30 to 63
BoB 1–7	Bundles of badges, 1 to 7. See text for components.	(see following table)
Round One Rejections	Total number of rejections, this round.	0 to 1

NOTES

See Key to Appendix Two. For individual tests, all rejections are shaded aqua. Composite scores and ranges are shaded yellow except for outlier scores—rejections for core Shakespeare baseline, non-rejections for all other categories—which are shaded red or gray. The profile boundaries are given at the bottom of the tables.

SUMMARY OF RESULTS

Only one of 29 Shakespeare core plays, *The Comedy of Errors*, has as many as two individual rejections in this round of 17 tests. Of 79 claimant and apocrypha plays, only two have fewer than two rejections. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.

Shakespeare Play Baseline Data, Round One Tests

Play	Date Late	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	with (21ws)	no /(no-not)	it (lws)	it (fws)	the (21ws)	BaB1	BaB3	BaB5	BaB7	T-E Slope Test	T-E Rare Words	T-E New Words	Aggregate Buckets	Number of Tests	Discrete Rejections	Discrete Composite Probability (2%)	Continuous Composite Error	Continuous Composite Probability
R3	1593	5	85	16	17	12	311	16	9	53	425	-109	358	688	-0.01	37	5	-0.95	17	0	1.00E+00	3.5953	7.4111E-01
Shr (e)	1594	4	82	15	11	17	287	13	9	51	641	80	159	434	-0.05	55	-3	1.49	17	0	1.00E+00	3.3345	8.5032E-01
TGV (e)	1594	5	76	17	16	16	287	12	9	43	577	78	120	497	0.06	63	2	0.04	17	1	2.907E-01	3.8947	5.8333E-01
Err (e)	1594	5	75	16	12	14	261	24	10	61	575	31	236	466	-0.04	63	1	0.54	17	0	1.00E+00	3.5030	7.8346E-01
R2	1595	7	82	9	23	10	317	9	7	46	269	-174	435	779	-0.04	22	-3.01	17	2	4.459E-02	6.6600	3.0349E-04	
LLI (e)	1595	5	133	9	14	11	300	17	15	70	549	108	308	726	-0.13	11	-11	1.29	17	0	2.907E-01	5.1498	6.5486E-01
Jn	1596	6	93	9	23	18	264	16	12	46	368	-92	382	724	-0.04	25	1	0.66	17	0	1.00E+00	4.0330	5.0513E-01
MND (e)	1596	5	124	8	15	15	329	8	11	47	520	52	272	900	-0.10	19	-1	0.67	17	1	2.907E-01	3.3023	8.6143E-01
Ron	1596	4	113	9	16	14	283	11	10	41	328	-4	192	602	-0.02	49	-4	-1.67	17	0	1.00E+00	3.4298	8.1424E-01
H44	1597	5	137	12	29	12	307	19	9	57	386	12	264	524	-0.05	37	-5	0.36	17	0	1.00E+00	3.4313	8.6947E-01
WV (e)	1597	4	180	17	19	17	307	12	12	38	386	217	164	629	-0.03	63	-14	-0.38	17	0	1.00E+00	3.4313	8.6947E-01
M6V	1597	5	64	13	27	12	294	22	14	77	671	130	321	679	-0.01	63	-6	-0.23	17	1	2.907E-01	4.5201	2.5277E-01
2H4	1598	5	105	14	27	17	324	16	15	46	562	-46	337	632	-0.01	38	-6	0.22	17	0	1.00E+00	2.4853	9.9192E-01
JC	1599	4	43	15	22	13	266	17	12	50	568	111	407	723	0.05	77	3	-0.44	17	1	2.907E-01	4.2579	3.8070E-01
Ado (e)	1599	4	65	19	19	19	341	30	12	42	690	197	202	620	0.04	89	2	-1.44	17	0	1.00E+00	5.4200	3.1209E-02
ATL (e)	1599	5	67	18	23	19	358	18	12	40	612	161	286	692	0.00	65	0	-3.53	17	1	2.907E-01	4.3377	3.3922E-01
Ham	1601	5	70	15	27	11	308	19	16	53	605	40	397	454	-0.09	28	-8	1.43	17	0	1.00E+00	3.7082	6.8466E-01
TN (e)	1602	4	79	17	23	21	351	17	9	39	598	147	215	486	-0.02	68	-3	0.10	17	0	1.00E+00	3.3802	8.3360E-01
Tro	1602	4	83	15	26	14	298	16	7	44	502	70	318	431	-0.09	15	-9	-0.16	17	0	1.00E+00	3.0306	9.3429E-01
MEM	1603	5	59	20	30	21	287	21	12	48	700	156	348	429	-0.03	59	-1	-0.28	17	0	1.00E+00	3.6795	6.9944E-01
AWW (e)	1603	5	60	19	32	12	294	25	17	36	656	144	267	397	-0.03	58	-1	-1.39	17	0	1.00E+00	4.3521	3.3194E-01
Oh	1604	4	47	17	24	16	242	15	14	43	678	121	199	278	-0.01	53	-2	-1.39	17	0	2.907E-01	3.8977	5.8163E-01
Lr	1605	4	106	19	31	17	356	11	7	41	449	9	295	327	-0.01	21	-8	0.51	17	0	1.00E+00	4.0644	4.8734E-01
Nic	1605	4	104	18	35	18	356	11	11	35	452	-21	411	377	-0.05	29	-7	0.43	17	0	1.00E+00	3.8803	5.9147E-01
Cy	1607	4	82	17	4	16	297	10	12	37	432	31	320	397	-0.05	29	-7	0.24	17	0	1.00E+00	3.7449	7.0316E-01
Cy	1608	5	57	18	46	20	318	14	8	47	552	53	487	304	-0.02	35	-4	-1.66	17	0	1.00E+00	3.7449	6.6338E-01
Cym	1610	5	75	20	47	13	320	17	11	41	545	53	285	393	-0.02	18	0	-1.13	17	0	1.00E+00	2.2715	9.9728E-01
Temp	1611	4	126	22	46	6	357	9	9	31	317	-17	180	441	-0.08	6	-6	-0.68	17	1	2.907E-01	5.5431	2.1561E-02
WT	1611	5	118	21	48	15	294	23	9	44	617	66	278	375	-0.05	37	-5	0.43	17	0	1.00E+00	2.7265	9.7721E-01

Discrete Discrimination Statistics

Rejections Percentage	0	2	7%	0%	0%	0%	1	3%	0%	0%	0%	1	3%	1	3%	0%	0%	0%	2	7%	10

Aggregates

Blocks Tested	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29

Plays Baseline: Standard Statistical Profile

Blocks Tested	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29

Plays Baseline: Line Ending Statistics by Period

Early (to 1597)	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade	Level	HCW	Fem Endings	Open Lines	with (21ws)	no /(no+not)	it (fws)	it (fws)	the (21ws)	BaB1	BaB3	BaB5	BaB7	T-E Slope	T-E Rare Words	T-E New Words	Aggregate Buckets	2.00	2.00	2.00	2.00	2.00

Claimant Plays versus Shakespeare Baseline: Round One Tests

Discrete Discrimination Statistics																							Composite Discrimination Statistics																						
Date	Grade	HCW	Endings	Lines	(%)	with	(2lws)	no	(/no/not)	it (lws)	it (fws)	BoA1	BoA3	BoA5	BoA7	T-E Slope	T-E Rate	T-E New	Aggregate	Number	Discrete	Composite	Composite																						
Lat	Level	/20K	%C	%C	%C	(2lws)	(%)	(/no/not)	(%)	(fws)	(fws)					Test	Words	Words	Buckets	Tests	Rejections	Probability	Probability																						
1607	7	33	19	26	16	332	17	7	33	577	55	150	164	-0.04	68	-10	0.31	17	4	3.09E-04	6.1509	2.590E-03																							
1602	5	51	14	31	8	335	25	23	26	762	164	241	100	-0.01	66	-12	-0.05	17	6	6.55E-07	7.3403	1.035E-05																							
1607	9	31	19	26	9	353	2	4	30	276	-280	228	613	-0.03	5	-2	-6.82	17	8	5.29E-10	10.2965	6.7794E-15																							
1593	8	31	12	26	9	353	2	4	30	276	-280	228	613	-0.03	5	-2	-6.82	17	8	5.29E-10	10.2965	6.7794E-15																							
1607	5	44	14	42	9	349	15	13	36	474	-18	334	182	-0.01	-64	-20	-4.03	17	6	6.55E-07	8.4309	1.404E-08																							
1608	4	88	14	23	11	396	14	12	39	650	159	130	100	-0.09	18	-26	-5.04	17	7	2.08E-08	5.0018	1.610E-10																							
1604	3	35	34	26	12	345	36	10	32	565	147	-9	-113	-0.02	55	-8	0.38	15	6	6.55E-07	10.7337	<1.000E-15																							
1604	7	6	6	30	9	310	30	9	36	346	13	186	605	0.06	67	-3	-0.02	17	1	2.61E-01	6.2970	5.116E-04																							
1616	5	53	39	23	7	409	24	7	26	432	105	29	501	0.01	57	-11	-1.08	17	7	2.08E-08	14.1974	<1.000E-15																							
1617	2	10	30	23	13	465	33	11	26	451	147	40	477	0.03	66	-28	-0.16	15	7	7.15E-09	10.4537	<1.000E-15																							
1618	3	16	33	23	15	410	35	6	33	393	79	119	32	0.11	72	-14	0.20	15	8	1.45E-10	8.7356	3.29E-10																							
1619	7	1	10	35	24	322	34	6	23	444	156	61	335	0.01	72	-21	-1.06	15	5	2.72E-07	7.8607	1.28E-07																							
1619	7	1	10	35	24	322	34	6	23	444	156	61	335	0.01	72	-21	-1.06	15	5	2.72E-07	7.8607	1.28E-07																							
1619	4	19	33	23	14	369	37	29	25	530	87	147	589	0.07	48	-44	0.90	15	7	7.15E-09	9.4756	1.105E-12																							
1587	10	5	5	26	9	356	7	8	61	405	-187	461	862	-0.10	34	-11	-3.56	17	8	5.29E-10	10.7996	<1.000E-15																							
1591	6	47	5	17	16	217	3	4	62	324	-472	318	487	-0.17	-11	-32	-2.16	17	9	1.07E-11	10.1298	2.909E-14																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470	2.580E-05																							
1603	8	20	15	23	15	359	8	4	59	433	-40	258	727	-0.04	17	-14	-0.47	17	3	4.40E-03	6.1470																								

Discrete Discrimination Statistics

Grade	HCW	Fem	Open	with	no	it (lws)	it (lws)	BoA1	BoA3	BoA5	BoA7	T-E Slope	T-E Rate	T-E New	Aggregate	Number	Discrete	Discrete	Continuous	Continuous
Level	35%	51	40	51	51	51	51	51	51	51	51	51	51	51	51	39%	51	51	51	51

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade	HCW	Fem	Open	with	no	it (lws)	it (lws)	BoA1	BoA3	BoA5	BoA7	T-E Slope	T-E Rate	T-E New	Aggregate	Number	Discrete	Discrete	Continuous	Continuous
Level	35%	51	40	51	51	51	51	51	51	51	51	51	51	51	51	39%	51	51	51	51
Global Min	4	52	8	11	9	342	8	7	30	384	174	189	278	-14	2	14	18	35%	845	845
Global Max	7	180	22	50	21	158	30	18	63	758	247	487	779	0.06	89	5	2.00	51	51	51
Early Min	4	52	8	11	9	342	8	7	30	384	174	189	278	-14	2	14	18	35%	845	845
Early Max	7	180	22	50	21	158	30	18	63	758	247	487	779	0.06	89	5	2.00	51	51	51
Middle Min	4	52	8	11	9	342	8	7	30	384	174	189	278	-14	2	14	18	35%	845	845
Middle Max	7	180	22	50	21	158	30	18	63	758	247	487	779	0.06	89	5	2.00	51	51	51
Late Min	4	52	8	11	9	342	8	7	30	384	174	189	278	-14	2	14	18	35%	845	845
Late Max	7	180	22	50	21	158	30	18	63	758	247	487	779	0.06	89	5	2.00	51	51	51

Sh Discrete Rejection Profile (See note in key)

Minimum





**APPENDIX FOUR: KEY TO TABLES FOR ROUND TWO PLAY TESTS**  
**CONTRACTIONS, METRIC FILLERS, SELECTED WORDS AND PHRASES, PER 20,000 WORDS**

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
I'm:	Occurrence rate of <i>I'm</i> (per 20,000 words).	0 to 1*
you're: T	Occurrence rate of <i>you're</i> or <i>y'are</i> .	before 1608: 0 to 2* from 1608: 0 to 6*
we're	Occurrence rate of <i>we're</i> .	0*
I've	Occurrence rate of <i>I've</i> .	0*
you've	Occurrence rate of <i>you've</i> or <i>y'have</i> .	0*
'em	Occurrence rate of <i>'em</i> .	0 to 9*
Total 1	Total of preceding six columns.	0 to 9
on't: T	Occurrence rate of <i>on't</i> .	To 1600: 0 to 2 From 1600: 1 to 11
ne'er	Occurrence rate of <i>ne'er</i> .	1 to 12
e'en	Occurrence rate of <i>e'en</i> .	0 to 3
i'faith	Occurrence rate of <i>i'faith</i> .	0 to 8
th': T	Occurrence rate of <i>th'</i> .	(see following table)
i'th': T	Occurrence rate of <i>i'th'</i> .	before 1600: 0 to 9 from 1600: 6 to 20
ha'	Occurrence rate of <i>ha'</i> .	0 to 5
Total 2: T	Total of preceding seven columns.	before 1601: 6 to 37 from 1601: 42 to 115
'll	Occurrence rate of <i>'ll</i> . (Example: <i>I'll</i> .)	31 to 90
'd   'ld: T	Occurrence rate of <i>'d</i> or <i>'ld</i> . (Examples: <i>I'd</i> or <i>I'ld</i> but not <i>curs'd</i> .)	before 1602: 0 to 2 from 1602: 3 to 11
'tis	Occurrence rate of <i>'tis</i> .	16 to 67
if that	Occurrence rate of <i>if that</i> as a conjunctive affix or metric filler. (Example: " <i>If that</i> the world and life were young," but not, " <i>If that</i> were so.")	0 to 6
the which	Occurrence rate of <i>the which</i> as a metric filler. (Example: "to <i>the which</i> place.")	0 to 8
Other Fillers	Combined rate for other metric fillers: <i>when that</i> , <i>since that</i> , <i>sith that</i> .	0 to 5
Total Fillers	Total of all metric filler rates.	1 to 13*
I do	Occurrence rate of <i>I do</i> , excluding <i>I do not</i> .	6 to 41
I do + verb	Occurrence rate of periphrastic verbs with <i>I do</i> (such as <i>I do weep</i> ), excluding <i>I do not</i> .	5 to 28
Round Two Rejections	Total number of rejections, this round.	0 to 1

SUMMARY OF RESULTS

See Key to Appendix Two. \* = not shown or counted separately. In 15 tests no Sh. play had more than one rejection, but 98% of the Claimant plays and 89% of the Apocrypha plays had two or more.

### Shakespeare Play Baseline Data, Round Two Tests

Date Late	Play	Total	1	ont	ne'er	e'en	l'arth	th'	thb'	ha'	ll	d   d	'is	if that	the which	Other Filters	I do	I do + verb	Number of Tests	Discrete Rejections	Discrete Composite Probability (1.3%)	Continuous Composite Error	Continuous Probability	
1593	R3	0	1	1	1	0	0	7	0	0	41	0	22	2	2	4	18	13	16	0	1.000E+00	3.3005	8.1604E-01	
1594	Shr(e)	1	1	4	1	0	1	3	4	4	79	1	52	4	0	7	5	5	16	0	1.000E+00	4.7203	1.3434E-01	
1594	TGN (e)	5	1	0	4	0	0	0	0	5	73	2	46	2	0	0	19	13	16	0	1.000E+00	5.7066	4.0293E-02	
1594	Err (e)	1	0	10	1	0	0	6	1	0	64	0	24	1	1	4	11	16	0	1.000E+00	4.1528	3.6888E-01		
1595	R2	0	0	5	0	0	0	0	0	0	31	0	24	2	3	0	16	13	16	0	1.000E+00	3.1157	8.8145E-01	
1595	LLLL (e)	0	0	6	0	0	0	0	0	0	40	0	19	1	3	1	24	21	16	0	1.000E+00	2.9145	9.3277E-01	
1596	In	0	0	6	0	0	2	12	1	0	31	0	19	1	5	4	2	17	14	16	0	1.000E+00	4.1794	3.5599E-01
1596	MND (e)	0	1	0	2	0	0	6	4	0	41	0	6	0	1	0	24	19	16	1	1.889E-01	3.8589	5.3265E-01	
1596	Rom	0	2	7	2	0	0	74	0	0	74	0	34	2	2	1	15	6	16	0	1.000E+00	3.1489	8.7100E-01	
1597	IH4	1597	85	0	4	0	0	5	3	106	106	0	23	2	3	1	15	6	16	1	1.889E-01	3.6228	6.6364E-01	
1597	MeV (e)	2	2	4	0	0	0	17	9	3	41	0	46	0	3	1	17	18	16	0	1.000E+00	5.1059	5.3047E-02	
1597	MeV	554	0	1	5	1	1	10	1	0	54	0	19	2	4	0	21	18	16	0	1.000E+00	2.4940	9.8812E-01	
1598	2H4	0	1	4	1	0	0	21	3	0	41	0	20	0	8	2	14	10	16	0	1.000E+00	4.9191	8.5283E-02	
1599	JC	7	1	3	0	0	0	6	2	1	31	0	18	0	7	1	32	22	16	0	1.000E+00	4.0941	4.0117E-01	
1599	Ado (e)	0	1	2	0	0	0	4	0	1	46	0	31	4	5	5	24	14	16	0	1.000E+00	4.2498	3.2035E-01	
1599	AYL (e)	1	0	3	0	0	0	10	5	0	60	0	0	3	1	0	20	11	16	1	1.889E-01	5.4376	2.0376E-02	
1601	Han	1	5	1	1	7	0	1	49	13	51	0	49	1	3	1	20	16	16	1	1.000E+00	4.2941	2.9880E-01	
1602	4	7	2	0	0	0	8	12	8	0	78	6	33	3	1	0	28	16	16	0	1.000E+00	3.2904	8.2006E-01	
1602	TN (e)	0	2	5	0	0	0	27	8	1	90	3	39	1	0	3	20	13	16	0	1.000E+00	3.6298	6.5987E-01	
1603	Tro	1	3	0	1	0	0	35	7	0	49	6	47	0	1	0	29	22	16	0	1.000E+00	2.8590	9.5265E-01	
1603	MM	7	6	3	3	2	0	32	12	1	59	6	41	0	3	0	19	13	16	0	1.000E+00	2.8950	9.5265E-01	
1603	AWW (e)	0	5	0	0	0	0	32	0	0	57	0	41	2	0	0	16	13	16	0	1.000E+00	2	9.6714E-02	
1605	Zm	7	2	4	0	0	0	6	20	2	70	4	47	2	2	2	16	13	16	0	1.000E+00	2.6955	9.6714E-01	
1606	Mac	5	0	0	0	0	0	69	16	0	54	6	46	0	2	2	7	6	16	0	1.000E+00	3.7221	8.4933E-01	
1607	Aut	2	6	8	3	0	73	20	3	69	3	50	2	2	2	0	14	8	16	0	1.000E+00	3.7680	5.8397E-01	
1608	Cor	9	5	6	0	0	0	127	30	1	66	8	38	2	2	5	17	11	16	1	1.889E-01	4.6773	1.4721E-01	
1610	Cym	7	11	5	0	0	0	83	24	1	77	6	40	1	3	1	15	8	16	0	1.000E+00	2.9010	9.3551E-01	
1611	Temp	20	4	0	4	0	0	78	20	0	88	5	24	0	2	0	27	17	16	1	1.889E-01	5.0321	6.4533E-01	
1611	WT	6	10	4	0	0	0	69	15	3	76	11	39	1	2	1	14	11	16	0	1.000E+00	3.6850	6.302E-01	

### Discrete Discrimination Statistics

Diverse Discrimination Statistics				Aggregates			
1	0	0	1	0	0	0	0
3%	0%	0%	3%	0%	3%	0%	0%
Regressions				Blocks Trained			
Percentage				464			

### Plays Baseline: Standard Statistical Profile

[illegible]

## Plays Baseline: Selected Statistics by Period

Plays baseline, selected statistics by period	from 1600 to 1606	from 1606 to 1610	from 1610 to 1620	from 1620 to 1627
Count	16	16	16	16
Mean	0.63	8.00	1.94	0.18
Std Dev	0.70	5.30	2.44	0.51
Count			6	
Mean			31.67	
Std Dev			11.10	
Count		from 1605	87	from 1602
Mean		5.77	81.14	12
Std Dev		3.02	19.20	6.00
Count			4.98	2.27

### Shakespeare Corpus Baseline: Consolidated Discrete Profile

Unscripted Corpus baseline, Consonantal Discrete <i>r</i> regime																		
	Total	1	ont	ne'er	e'en	f'faith	th'	th'	th'	ha'	ll	d   d	's	if that	the which	Other Failers	I do	I do + verb
Global Min	0	0	1	0	0	0	1	0	0	0	31	0	17	0	0	0	6	5
Global Max	9	11	12	3	8	8	127	20	0	5	90	11	67	6	8	5	41	28
Early Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Early Max	2	2	0	0	0	0	26	9	0	0	to 602	2	2	0	0	0	0	0
Middle Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle Max	0	0	0	0	0	0	1600	1604	0	0	0	0	0	0	0	0	0	0
Late Min	0	0	0	0	0	0	4	20	0	0	0	0	0	0	0	0	0	0
Late Max	from 1600	1	0	0	0	0	from 1605	67	0	0	from 1602	3	0	0	0	0	0	0
Unscripted Min	0	0	1	0	0	0	127	20	0	0	0	11	0	0	0	0	0	0

### Claimant Plays versus Shakespeare Baseline: Round Two Tests

Date Late	Playwright/Play	Total I	Discrete Discrimination Statistics										Composite Thresholds										Continuous Composite Probability
			on'	nc'	c'm	Flaish	thr	thr'	ha'	Tl	d'l'd	'tis	if that	th-which	Other Filters	I do	I do + verb	Number of Tests	Discrete Rejections	Discrete Composite Probability (1.36)	Continuous Composite Error		
1607	Beaumont: PELS	16	0	0	0	18	0	0	0	102	0	38	1	0	0	24	9	16	8	9.567E-12	10.8081	<1.000E-15	
1602	Chapman: USHR	0	0	1	0	0	0	0	0	0	0	0	0	0	0	15	7	16	6	3.456E-08	7.5246	1.9219E-06	
1607	USHR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	16	9	1.121E-13	8.9708	1.3606E-10	
1255	BUSS: Cleop	0	1	0	0	0	85	0	24	4	0	24	6	1	4	7	16	5	1.086E-03	15.8601	<1.000E-15		
1607	Diogenes: CLEO	57	0	5	0	0	17	8	11	70	2	39	0	0	0	5	2	16	7	6.477E-10	15.5854	<1.000E-15	
1608	WAB: AB	41	2	7	1	6	24	15	41	139	5	51	0	0	0	6	4	16	5	1.439E-06	30.1334	<1.000E-15	
1604	Fletcher	67	0	0	0	3	0	0	0	140	1	46	0	0	0	30	14	16	7	6.477E-10	16.6728	<1.000E-15	
1604	WRPZ: WRPZ	0	0	0	0	0	0	0	0	114	2	64	0	0	0	0	0	16	7	6.477E-10	16.6728	<1.000E-15	
1616	MTOM	30	8	7	0	1	28	6	0	140	0	64	0	0	0	29	17	16	4	4.587E-05	9.0992	5.1958E-11	
1617	CHNC	0	0	0	0	0	0	0	0	109	0	49	0	0	0	23	17	16	7	6.477E-10	15.3766	<1.000E-15	
1618	LOYL	104	0	0	0	0	0	0	0	1	103	0	54	0	0	13	4	16	8	9.567E-12	24.7698	<1.000E-15	
1619	DEMT	67	7	9	0	0	46	20	1	94	0	61	0	0	0	12	0	16	5	1.439E-06	15.9877	<1.000E-15	
1619	NSN	41	1	1	0	5	0	0	35	0	0	69	0	0	6	9	16	8	6.477E-10	11.8648	<1.000E-15		
1619	NSN	78	0	0	0	1	68	0	1	08	0	17	0	0	17	0	16	8	9.567E-12	11.8648	<1.000E-15		
1587	Greene: ALPH	0	13	0	0	3	0	0	41	11	25	19	32	27	16	16	6	3.456E-08	29.7590	<1.000E-15			
1591	FBFB	2	0	9	0	0	0	0	85	0	26	9	4	2	2	16	3	1.084E-03	8.0417	8.3984E-08			
1591	IAMA	0	0	0	0	0	3	0	0	40	1	16	3	0	2	3	1	16	4	4.587E-05	5.3102	2.9938E-02	
1603	HEWY: HEWY	2	0	0	0	0	0	0	94	1	34	0	0	7	5	16	6	3.456E-08	6.8114	8.4569E-05			
1603	SEIA	2	0	2	0	0	0	0	24	3	24	0	1	0	7	4	16	5	1.439E-06	6.2245	1.1839E-03		
1606	VOLP	24	0	0	5	12	0	23	59	5	41	0	0	0	27	19	16	6	3.456E-08	17.4720	<1.000E-15		
1610	ALCH	45	10	6	4	6	19	25	59	122	7	33	0	0	16	10	16	6	3.456E-08	42.2479	<1.000E-15		
1614	BART	60	14	3	2	1	50	4	45	7	23	0	0	0	17	7	16	8	9.567E-12	51.5585	<1.000E-15		
1614	BART	60	14	3	2	1	50	4	45	7	23	0	0	0	17	7	16	8	9.567E-12	51.5585	<1.000E-15		
1616	WTC	30	23	4	1	37	1	4	129	9	102	0	0	0	14	8	16	8	9.567E-12	20.1227	<1.000E-15		
1616	WTC	30	23	4	1	37	1	4	129	9	102	0	0	0	14	8	16	8	9.567E-12	20.1227	<1.000E-15		
1618	HENG	25	8	15	0	1	8	1	90	7	68	0	0	6	2	16	7	6.477E-10	7.7286E-15	<1.000E-15			
1621	WBWM	106	26	20	16	1	43	1	1	92	11	92	0	0	2	1	16	9	1.121E-13	28.9607	<1.000E-15		
1624	GAME	95	22	9	2	0	24	8	1	60	23	51	0	0	5	2	16	6	3.456E-08	24.0085	<1.000E-15		
1624	GAME	95	22	9	2	0	24	8	1	60	23	51	0	0	5	2	16	6	3.456E-08	24.0085	<1.000E-15		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0	1	5	0	0	0	0	0	86	0	12	0	0	3	6	16	3	1.086E-03	3.3845	1.4455E-05		
1592	McCabe: MCC	0																					

Sh Discrete Rejection Profile (See note in key)	
Minimum	0
Maximum	1

Play	Date Late	Total	on't	ne'er	e'en	i'faith	th'	i'hi'	ha'	'll	d   d	'is	if that	the which	Other Fillers	1 do	1 do + verb	Number of Tests	Discrete Rejections	Composite Probability (1.3%)	Continuous Composite Error	Continuous Composite Probability	
<i>Dubinda and Sar-asides</i>																							
1146	1590	2	0	17	0	0	5	0	0	76	0	17	3	2	0	6	6	16	1	1.889E-01	7.0738	2.260E-05	
2146	1591	1	0	5	0	1	8	2	0	55	1	36	2	1	1	11	3	16	0	1.000E-00	2.7749	9.5750E-01	
3146	1591	0	0	10	1	0	3	0	1	73	1	30	0	0	3	6	3	16	1	1.889E-01	5.0388	6.3084E-02	
H5	1599	1	0	3	0	2	26	3	1	33	3	28	2	5	1	16	10	16	0	1.000E-00	4.3456	2.7471E-01	
H8 (F)	1613	126	6	8	0	0	64	8	0	53	3	64	0	0	0	8	3	16	3	1.084E-03	29.0656	<1.000E-15	
H8 (H)	1613	80	0	10	0	0	110	20	2	32	2	47	0	0	0	15	5	16	5	1.439E-06	18.9878	<1.000E-15	
H8 (Sh)	1613	19	7	3	0	0	110	20	2	32	2	47	0	0	0	15	5	16	2	1.797E-02	5.6517	1.0176E-02	
Per, 1-2	1608	3	5	0	0	2	24	4	4	61	6	38	4	0	20	0	10	5	16	5	1.439E-06	12.4586	<1.000E-15
Per, 3-5	1608	8	2	12	2	2	24	4	4	61	6	38	4	0	20	0	10	5	16	2	1.797E-02	6.9539	4.1744E-05
Tim	1608	25	7	16	10	1	50	3	3	5	56	9	58	0	0	0	12	11	16	5	1.439E-06	11.3076	<1.000E-15
TNK (F)	1613	37	5	3	0	0	31	16	0	82	1	37	0	0	0	8	0	16	4	4.587E-05	9.4826	2.5886E-12	
TNK (Sh)	1613	33	7	1	0	0	91	15	0	74	3	29	1	6	0	8	6	16	1	1.889E-01	3.3334	8.0255E-01	
Tit	1594	0	0	4	0	0	2	0	0	42	0	29	0	0	0	13	9	16	0	1.000E-00	3.3334	8.0255E-01	
Tit ear	1594	0	0	0	0	0	2	0	0	51	0	23	0	0	2	15	13	16	1	1.889E-01	3.6785	6.3358E-01	
Tit late	1594	0	0	8	0	0	31	0	0	31	0	29	0	0	3	13	5	16	0	1.000E-00	4.1996	3.4860E-01	
STM (Sh)	1595	0	0	0	0	0	72	3	0	101	0	29	14	0	0	0	0	16	6	3.458E-08	16.6676	<1.000E-15	

*Dublandia and Ser-oides*

*Apocrypha*

HOPE	1567	7	0	7	2	0	0	0	0	0	39	2	0	14	17	17	24	22	16	5	1.439E-06	17.6313	<1.000E-15
FVH5	1588	0	0	0	0	0	0	0	0	8	139	2	31	5	0	0	1	5	16	4	4.587E-05	6.5915	2.3918E-04
TOAS	1590	13	0	13	2	3	3	0	0	0	57	0	35	3	0	0	25	21	16	4	4.587E-05	9.6404	7.1777E-13
IRON	1592	0	0	7	0	4	12	0	0	0	146	0	36	1	2	2	14	6	16	0	1.000E-00	3.6575	6.4500E-01
ARN	1592	0	0	21	0	0	0	0	0	0	66	1	22	4	1	1	5	4	16	3	1.084E-03	9.5229	1.8702E-12
YRK1	1592	1	0	9	0	0	0	0	0	0	78	1	28	2	2	2	0	7	16	2	1.797E-02	4.3714	2.6304E-01
GUWV	1593	0	6	14	0	0	8	0	0	2	134	3	13	3	0	0	2	9	16	6	3.456E-08	4.4447	2.3144E-01
LEIR	1593	1	0	25	0	0	0	4	0	0	81	7	21	4	0	0	3	25	17	2	1.797E-02	12.1359	<1.000E-15
ICD3	1594	0	0	6	0	0	1	0	0	0	14	0	14	0	0	0	11	9	16	3	1.084E-03	17.0007	<1.000E-15
STMO	1595	6	3	15	0	4	5	0	0	4	94	5	22	1	0	2	10	6	16	4	4.587E-05	4.3817	2.5846E-01
EDW3	1595	0	0	1	0	0	0	1	0	0	33	0	16	1	1	0	0	11	8	1	1.889E-01	3.9554	4.7799E-01
KN1	1595	0	0	3	0	0	0	0	0	0	33	0	17	1	3	0	11	8	16	1	1.889E-01	3.6112	6.6977E-01
KN2	1595	0	0	0	0	0	0	6	0	0	21	0	21	2	4	0	0	0	16	3	1.084E-03	4.9070	8.7801E-02
LOCR	1595	0	0	0	0	0	0	0	0	0	136	0	39	0	0	1	6	3	16	7	6.477E-10	6.6196	2.1013E-04
WOOD	1595	28	6	7	2	9	22	0	3	22	136	11	39	0	0	0	0	2	16	7	6.477E-10	28.3109	<1.000E-15
MUCE	1598	0	0	0	0	0	0	0	0	0	111	0	31	0	0	0	0	6	16	4	4.587E-05	5.0926	3.4686E-02
MLAC	1600	1	0	3	0	0	0	0	0	0	33	0	21	0	3	0	10	3	16	4	4.587E-05	5.8375	3.8375E-01
CEVIL	1604	5	1	2	0	0	4	0	0	0	44	0	21	0	4	4	27	0	16	4	4.587E-05	5.8375	3.8375E-01
DEVIL	1604	1	3	14	0	0	12	7	2	0	133	3	52	5	0	0	9	3	16	6	3.456E-08	9.4950	2.3427E-12
PROD	1605	8	0	10	0	0	22	0	0	0	155	8	38	1	1	0	20	10	16	5	1.439E-06	12.3339	<1.000E-15
PURN	1607	35	24	26	17	23	34	2	2	2	121	12	38	0	1	0	6	1	16	10	<1.000E-15	21.3018	<1.000E-15
YKSH	1608	31	3	17	0	21	0	10	7	56	7	49	0	0	0	0	10	7	16	5	1.439E-06	14.1164	<1.000E-15
MAID	1611	98	23	25	24	7	11	2	13	95	23	86	0	0	0	0	5	1	16	12	<1.000E-15	32.4273	<1.000E-15
FALS	1613	84	4	10	4	0	21	3	0	52	3	49	1	0	0	0	17	12	16	4	4.587E-05	19.8733	<1.000E-15
FAIR	1631	0	0	0	0	0	16	0	0	0	24	0	2	2	3	3	7	7	16	8	9.567E-12	10.1555	<1.000E-15
MERL	1631	4	5	8	1	8	11	2	0	85	7	41	1	0	0	1	12	7	16	2	1.797E-02	6.5373	3.0617E-04
RVGR	1606	100	18	21	29	22	39	14	0	4	101	20	94	0	0	0	4	3	16	11	<1.000E-15	33.4024	<1.000E-15

*Apocrypha Discrete Discrimination Statistics*

Rejections	14	4	8	20	9	5	15	8	8	1	1	2	6	11	28
Rejections	25%	32%	51%	71%	32%	18%	54%	29%	29%	46%	7%	21%	29%	29%	28
Blocks Tested	28	28	28	28	28	28	28	28	28	28	28	28	28	28	448

*Apocrypha Comp Discrimination Stats*

Rejections	25%	32%	51%	71%	32%	18%	54%	29%	29%	46%	7%	21%	29%	29%	28
Blocks Tested	28	28	28	28	28	28	28	28	28	28	28	28	28	28	448

*Shakespeare Corpus Baseline: Consolidated Discrete Profile*

Play	Total	1	on't	neer	e'en	i'faith	th'	i'hi'	ha'	'll	d   d	'is	if that	the which	Other Fillers	1 do	1 do + verb
Global Min	0	0	1	0	0	0	0	0	0	0	31	0	17	0	0	6	5
Global Max	9	11	12	3	8	8	127	20	5	90	11	67	6	8	5	41	28
Early Min	to 1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Early Max	to 1600	2	8	1600	1604	1600	1604	1604	1604	1602	2	2	2	2	2	2	2
Middle Min	from 1600	1	12	12	6	6	12	6	6	from 1602	3	3	3	3	3	3	3
Middle Max	from 1600	1	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Late Min	from 1600	1	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Late Max	from 1600	1	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11

*Composite Thresholds*

Discrete	1.889E-01	2.0376E-02
Continuous	86%	71%

Sh Discrete Rejection Profile (See note in key)  
Minimum 0  
Maximum 1

APPENDIX FIVE: KEY TO TABLES FOR ROUND THREE PLAY TESTS  
PREFIXES, SUFFIXES, INTENSIFIERS, ADVERSIONS, PER 20,000 WORDS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
where-   there-	Occurrence rate for <i>where-</i> or <i>there-</i> words, excluding <i>wherefore</i> and <i>therefore</i> (per 20,000 words).	3 to 19
dis-	Occurrence rate for <i>dis-</i> words. (Examples: <i>distress</i> but not <i>dish</i> .)	19 to 55
whereas   whenas: E	Occurrence rate for <i>whereas</i> or <i>whenas</i> .	0
un-	Occurrence rate for <i>un-</i> words. (Examples: <i>unable</i> but not <i>union</i> .)	28 to 65
ex-	Occurrence rate for <i>ex-</i> words. (Examples: <i>exculpate</i> , <i>extra</i> .)	17 to 55
fore-	Occurrence rate for <i>fore-</i> words. (Examples: <i>forewarn</i> , but not <i>foreign</i> .)	0 to 8
-able	Occurrence rate for <i>-able</i> or <i>-ible</i> words. (Examples: <i>comfortable</i> , but not <i>table</i> .)	10 to 35
-less	Occurrence rate for <i>-less</i> words. (Examples: <i>useless</i> , but not <i>bless</i> or <i>unless</i> .)	2 to 19
-ish	Occurrence rate for <i>-ish</i> words. (Examples: <i>British</i> , but not <i>dish</i> .)	1 to 22
-ly	Occurrence rate for <i>-ly</i> words. (Examples: <i>heavenly</i> , but not <i>fly</i> .)	98 to 161
-ment	Occurrence rate for <i>-ment</i> words.	11 to 36
Very: T	Occurrence rate for <i>very</i> .	before 1600: 6 to 31 from 1600: 16 to 42
most + mod: T	Occurrence rate for <i>most</i> with modifier. Example: <i>most noble</i> but not <i>most do</i> .)	before 1600: 8 to 32 from 1600: 14 to 50
See	Occurrence rate for adversions with <i>see</i> . (Includes <i>you see</i> or <i>we shall see</i> , but not <i>I see</i> or <i>you see not</i> .)	0 to 5
hark   listen	Occurrence rate for adversions with <i>hark</i> , <i>heark</i> , <i>list</i> , or <i>listen</i> , excluding first person or negatives.	1 to 15
Round Three Rejections	Total number of rejections, this round.	0 to 1
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite Shakespeare rejection; for others, gray or red = comp. non-rejection.	

SUMMARY OF RESULTS

No Shakespeare play had more than one rejection in these 15 tests, but 98% of the Claimant plays and 96% of the Apocrypha plays had two or more rejections. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.



Claimants versus Shakespeare Baseline, Round Three Tests

Play	Date Late	where- there-	dis-	whereas   whenever	un-	ex-	fore-	-able	-less	-ish	-ly	-ment	very	most + mod	see	hark   listen	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.5%)	Continuous Composite Error	Continuous Composite Probability
Beaumont: PESL Chapman USHR	1607	2	28	0	34	10	1	13	5	12	133	11	14	13	1	10	15	4	4.274E-04	5.2840	2.207E-02
BUSS	1602	12	45	0	40	51	10	17	13	19	166	17	25	31	31	6	15	3	5.674E-03	18.7230	<1.000E-15
Daniel: CLEO Dekker	1607	2	51	0	31	40	7	16	13	14	132	13	8	3	22	2	15	2	5.289E-02	4.6424	1.201E-01
WBAB	1593	40	119	3	71	48	6	10	7	1	97	16	3	22	4	0	15	7	3.291E-08	12.3658	<1.000E-15
HNWR	1607	1	31	0	54	14	9	18	5	6	115	20	15	41	14	2	15	5	2.377E-05	8.8969	9.9663E-11
Fletcher WPKZ	1608	2	21	0	28	13	3	7	1	16	75	9	23	13	4	1	15	7	3.291E-08	6.6256	1.1406E-04
VALN	1604	0	28	0	50	41	3	10	4	22	136	15	27	18	2	2	15	1	3.160E-01	4.7280	9.8853E-02
MTOM	1610	0	40	0	21	24	2	6	2	4	172	9	3	3	15	0	15	6	1.006E-06	6.4880	2.1738E-04
CHNC	1616	3	42	0	35	40	3	19	4	7	234	12	6	36	0	8	15	2	5.289E-02	6.4928	2.1263E-04
LOYL	1617	0	38	0	28	11	0	23	4	4	154	11	12	20	1	17	15	4	4.274E-04	6.2723	5.6965E-04
DENIT	1618	0	26	0	42	37	2	20	2	5	226	8	15	25	0	2	15	4	4.274E-04	6.6647	9.4551E-05
BARN	1619	0	35	0	29	38	1	27	5	12	188	6	24	22	0	6	15	3	5.674E-03	5.4294	1.3948E-02
ISLN	1619	1	48	0	59	44	2	22	3	22	163	26	3	39	2	1	15	3	5.674E-03	4.9638	5.5002E-02
Greene ALPH	1603	1	38	0	44	19	2	23	1	9	231	16	9	28	2	4	15	4	4.274E-04	6.3007	5.0347E-04
FBFB	1587	13	29	11	32	9	4	0	21	32	147	11	20	16	3	7	15	5	2.377E-05	18.6488	0.0000E+00
IAM4	1591	10	46	1	25	17	4	7	12	32	166	4	7	2	2	2	15	7	3.291E-08	6.8444	3.8973E-05
Heywood: HEYW Johnson	1591	18	51	3	29	25	2	3	29	42	92	15	3	6	1	1	15	7	3.291E-08	9.9686	1.7169E-14
SEJA	1603	1	43	0	39	32	1	14	9	1	111	15	7	14	1	2	15	2	5.289E-02	4.8661	7.0750E-02
VOLP	1603	13	31	5	41	45	5	14	5	4	119	17	5	49	8	2	15	3	5.674E-03	9.4478	1.3622E-12
ALCH	1606	10	63	1	36	46	3	20	6	9	135	20	16	49	19	6	15	3	5.674E-03	11.2481	<1.000E-15
BART	1610	10	38	1	25	25	12	13	1	25	117	12	22	13	5	4	15	6	1.006E-06	6.9520	2.2492E-05
NINN	1614	6	38	0	24	32	4	11	1	16	103	14	37	4	7	4	15	4	4.274E-04	6.1398	1.0001E-03
TTUB	1629	5	58	0	36	54	4	16	1	22	115	25	10	8	3	0	15	5	2.377E-05	5.8452	3.2268E-03
Kyd: SPTR	1633	2	14	0	7	14	2	2	0	12	87	2	29	5	2	5	15	9	1.666E-11	8.0772	3.1000E-08
Lily: LYWM Marlowe	1589	27	60	0	58	46	4	14	46	14	140	22	1	4	12	0	15	7	3.291E-08	11.4267	<1.000E-15
TAMI	1597	13	46	0	39	20	8	3	3	29	130	18	3	2	3	0	15	5	2.377E-05	6.3417	4.2049E-04
TAM2	1588	15	51	0	26	43	2	7	42	24	166	13	3	6	10	0	15	9	1.666E-11	10.2345	1.6283E-15
DFI6	1588	19	52	3	28	28	0	11	25	36	138	17	1	0	8	2	15	6	1.006E-06	9.5213	7.4895E-13
JEWJ	1588	12	41	1	17	32	12	14	9	15	155	14	4	7	17	5	15	6	1.006E-06	11.2148	<1.000E-15
EDW2	1589	22	39	1	32	31	1	9	12	11	152	9	9	6	7	1	15	6	1.006E-06	5.8610	3.0389E-03
MAPA	1592	9	47	4	51	27	3	15	13	10	119	16	4	6	3	2	15	3	5.674E-03	6.9311	2.5054E-05
DIDO	1593	19	52	2	23	25	14	2	15	15	162	14	6	4	8	4	15	7	3.291E-08	9.0498	3.1348E-11
Middletion PHOE	1586	23	39	16	44	19	1	7	19	17	134	15	1	3	9	6	15	6	1.006E-06	26.3062	<1.000E-15
MICL	1604	4	32	0	4	54	6	38	5	12	198	22	31	29	4	4	15	3	5.674E-03	0.0000	0.0000E+00
CHST	1606	6	49	1	48	36	10	18	3	8	195	25	21	23	2	0	15	4	4.274E-04	6.8466	3.8543E-05
NWIT	1611	1	26	1	40	17	4	24	7	19	144	12	11	13	1	0	15	4	4.274E-04	5.7446	4.6932E-03
MDIS	1613	5	48	2	36	24	2	24	7	13	140	17	7	14	0	2	15	4	5.289E-02	4.9763	5.3210E-02
WITC	1615	1	50	0	37	35	14	22	2	7	188	25	10	24	4	3	15	2	5.289E-02	5.1269	3.5131E-02
HENG	1616	1	30	1	37	30	4	30	5	3	189	15	10	13	1	21	15	4	4.274E-04	7.2850	3.7522E-06
BWMW	1618	2	28	0	43	36	7	24	5	5	151	23	11	25	8	10	15	6	1.006E-06	7.2153	5.5198E-06
GAME	1621	1	32	0	34	26	1	20	6	6	169	25	8	21	4	8	15	3	5.674E-03	5.7665	4.3305E-03
Munday: JKJC	1624	2	68	0	60	31	11	19	10	7	183	31	15	57	2	3	15	6	1.006E-06	5.2429	2.5003E-02
Nashe: WILL	1594	25	64	1	19	194	4	12	16	18	179	15	18	9	4	7	15	5	2.377E-05	6.7486	6.2822E-03
	1592	11	37	1	41	54	4	17	6	14	113	21	10	14	0	0	15	2	5.289E-02	6.3440	4.1624E-04
																				3.8703	4.5291E-01



Claimants versus Shakespeare Baseline, Round Three Tests

Play	Date Date	where- there-	dis- wheras   whenas	un- ex-	fore- -able	-less -ish	-ly -ment	very mod	most + mod	see	hark   listen	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.5%)	Continuous Composite Error	Continuous Composite Probability
Peele	1584	25	61	0	2	45	6	176	24	6	20	15	6	1.006E-06	9.7097	1.5694E-13
ARPA	1594	9	53	1	7	30	4	136	9	0	1	15	6	1.006E-06	7.2659	4.1733E-06
DBET	1567	24	27	12	0	2	7	105	37	10	34	15	6	1.006E-06	20.1372	<1.0000E-15
Pickering: HORE	1598	2	25	3	2	4	3	71	9	16	5	15	9	1.666E-11	8.8210	1.7571E-10
Porter: ANWO	1590	0	36	0	18	45	9	152	9	0	9	15	7	3.291E-08	11.7404	<1.0000E-15
Sidney: ANTO	1615	5	62	0	28	14	26	101	13	4	24	15	3	5.674E-03	5.7713	4.2544E-03
Smith: HECT	1581	17	70	0	14	1	13	144	24	30	12	15	3	5.674E-03	5.4051	1.3089E-02
Wilson: 3LDY																

Discrete Discrimination Statistics

Rejections	28	10	22	15	8	15	23	11	31	23	13	11	243	50	9.7097	49
Percentage	55%	20%	43%	29%	16%	29%	45%	22%	61%	45%	25%	22%	32%	98%	96%	96%
Blocks Tested	51	51	51	51	51	51	51	51	51	51	51	51	765	51	51	51

Aggregates

Rejections	28	10	22	15	8	15	23	11	31	23	13	11	243	50	9.7097	49
Percentage	55%	20%	43%	29%	16%	29%	45%	22%	61%	45%	25%	22%	32%	98%	96%	96%
Blocks Tested	51	51	51	51	51	51	51	51	51	51	51	51	765	51	51	51

Composite Discrimination Statistics

Rejections	28	10	22	15	8	15	23	11	31	23	13	11	243	50	9.7097	49
Percentage	55%	20%	43%	29%	16%	29%	45%	22%	61%	45%	25%	22%	32%	98%	96%	96%
Blocks Tested	51	51	51	51	51	51	51	51	51	51	51	51	765	51	51	51

Shakespeare Corpus Baseline: Consolidated Discrete Profile

	where- there-	dis- wheras   whenas	un- ex-	fore- -able	-less -ish	-ly -ment	very mod	most + mod	see	hark   listen
Global Min	3	19	0	10	2	1	98	11	6	8
Global Max	19	55	0	35	19	22	161	36	42	50
Min to 1600										
Max to 1600										
Min from 1600										
Max from 1600										

Composite Thresholds

	Discrete	Continuous
Minimum	3.160E-01	9.9940E-02
Maximum		

Dubitanda and Ser-asides, Apocrypha Plays versus Shakespeare Baseline: Round Three Tests

Play	Date Late	where there-	dis-	whereas whereas	un-	ex-	fore-	-able	-less	-ish	-ly	-ment	very	most+ mod	see	hark listen	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.5%)	Continuous Composite Error	Continuous Composite Probability
Dubitanda and Ser-asides																					
1H6	1590	17	65	3	40	52	1	17	17	34	123	23	7	9	6	9	15	4	4.274E-04	8.3373	1.0744E-08
2H6	1591	8	38	2	38	32	7	13	25	18	108	17	6	10	3	2	15	1	3.160E-01	4.4591	1.7644E-01
3H6	1591	14	26	3	48	23	7	13	25	18	111	20	8	3	4	3	15	3	5.674E-03	6.9639	2.1147E-05
H5	1599	10	46	0	34	47	4	23	5	52	147	33	16	32	1	3	15	1	3.160E-01	8.4993	1.7784E-09
H8, (F)	1613	0	31	0	34	22	0	17	6	22	162	8	11	31	0	3	15	4	4.274E-04	5.2185	2.6896E-02
H8, (H)	1613	0	20	0	35	20	0	5	15	10	186	30	5	35	0	0	15	5	2.377E-05	6.4965	2.9903E-04
H8, (Sh)	1613	18	37	0	45	35	10	13	8	5	37	23	8	42	10	0	15	4	4.274E-04	7.1361	8.4975E-06
Per, 1-2	1608	5	38	5	48	38	0	13	8	10	147	25	8	5	3	0	15	5	2.377E-05	9.3784	2.3844E-12
Per, 3-5	1608	12	28	0	40	26	2	26	8	10	147	25	8	5	3	0	15	5	2.377E-05	3.1894	8.0871E-01
un-	1608	6	35	0	47	43	0	41	5	2	169	24	16	20	3	0	15	2	3.289E-02	4.9153	6.2007E-02
TNK, (F)	1613	9	33	0	45	32	0	10	5	2	169	24	16	20	3	0	15	2	3.289E-02	7.4555	1.3485E-09
TNK, (Sh)	1613	14	39	0	45	32	1	10	5	0	161	21	14	29	0	8	15	2	5.289E-02	4.2623	2.5398E-01
Tit	1594	9	46	1	36	20	0	21	17	7	136	13	9	8	11	9	15	2	5.289E-02	6.9042	2.5763E-05
Tit early	1594	0	62	0	36	13	0	9	23	8	113	15	6	6	11	9	15	7	3.291E-08	10.2718	1.1669E-15
Tit late	1594	21	26	3	56	28	0	14	0	5	169	13	13	10	8	10	15	5	2.377E-05	7.7605	2.3067E-07
STM (Sh)	1595	14	14	0	43	0	14	14	0	14	101	0	0	0	14	0	15	9	1.666E-11	11.6313	2.1684E-19

Apocrypha

HOE	1567	24	27	12	20	17	0	2	2	7	105	37	10	34	3	8	15	6	1.006E-06	20.1372	<1.000E-15
FVH5	1588	16	21	8	30	11	11	21	0	13	104	11	29	13	3	0	15	5	2.377E-05	13.0871	<1.000E-15
TOAS	1589	3	21	3	13	8	2	8	5	16	188	5	8	3	3	10	15	7	3.291E-08	8.4376	2.7501E-09
IRON	1590	4	99	19	48	9	25	20	24	122	16	16	8	5	7	7	15	7	3.291E-08	30.8990	<1.000E-15
YKSH	1590	11	38	3	33	14	9	11	15	7	103	13	13	5	0	9	15	8	3.291E-08	10.6799	1.3507E-05
YKSH	1592	11	18	4	28	18	9	11	15	7	103	13	13	5	0	9	15	8	8.201E-10	8.8689	1.2344E-10
YRK2	1592	12	31	5	44	27	2	9	20	12	168	18	5	5	9	2	15	6	1.006E-06	9.8831	3.5774E-14
GLYW	1593	6	19	2	38	6	6	12	16	20	168	16	9	9	3	2	15	5	2.377E-05	7.0045	1.7112E-05
LEIR	1593	9	53	12	58	60	6	12	20	13	141	17	10	10	2	4	15	3	5.674E-03	19.5855	<1.000E-15
RCB3	1594	14	38	5	45	24	9	13	16	6	153	18	8	6	2	0	15	4	4.274E-04	9.0345	3.5237E-11
STMO	1595	13	37	0	23	33	7	13	11	21	130	21	18	17	25	4	15	2	5.289E-02	14.8317	<1.000E-15
EDW3	1595	15	76	2	45	42	4	22	25	31	132	21	3	9	2	3	15	5	2.377E-05	7.4242	1.7056E-06
KIN1	1595	24	52	4	54	37	4	4	18	25	126	8	1	4	4	3	15	7	3.291E-08	8.8622	1.2910E-10
KIN2	1595	17	64	0	52	29	6	17	23	31	145	6	4	6	0	4	15	6	1.006E-06	6.8239	4.3206E-05
LOC	1595	8	22	8	52	27	3	25	39	25	152	13	12	10	5	1	15	3	5.674E-03	14.7177	<1.000E-15
WOOD	1595	9	41	0	61	30	7	10	13	23	194	32	6	34	7	5	15	4	4.274E-04	6.6757	8.9601E-05
MUCE	1598	17	53	5	41	27	2	9	19	9	112	29	19	15	5	14	15	2	5.289E-02	9.2592	6.1577E-12
OLDG	1600	12	38	0	28	25	3	16	2	32	132	21	12	12	2	0	15	5	2.377E-05	5.6673	6.2006E-03
DEVR	1602	4	36	4	32	16	1	15	15	15	135	15	12	16	2	3	15	5	1.676E-06	14.4444	1.3507E-05
PROD	1604	7	26	0	35	17	7	5	5	17	143	19	26	16	2	14	15	1	3.160E-01	5.4633	1.2483E-02
PURN	1605	0	26	0	40	14	0	10	10	17	186	5	54	9	5	3	15	6	1.006E-06	7.2916	3.6165E-06
YKSH	1607	5	18	1	34	40	2	43	1	10	186	11	26	17	2	6	15	5	2.377E-05	6.3134	4.7606E-04
MAID	1608	3	35	0	98	66	7	28	7	17	126	7	14	14	0	7	15	4	4.274E-04	7.3880	2.0985E-06
FALS	1611	1	37	1	37	23	2	26	3	5	155	28	12	18	0	8	15	3	5.674E-03	4.7436	9.5307E-02
FAIR	1613	6	64	0	56	21	3	12	13	12	123	31	16	16	12	6	15	2	5.289E-02	7.7916	1.9041E-07
MERL	1631	54	73	3	76	31	7	33	14	16	236	28	14	10	5	0	15	8	8.391E-10	13.2035	-2.1684E-19
RVGR	1606	6	56	0	61	35	15	25	13	9	179	25	9	20	8	4	15	5	2.377E-05	10.0996	5.4268E-15

Apocrypha Discrete Discrimination Statistics																	Apocrypha Comp Discrimination Stats																
Rejections	5	8	19	8	8	6	9	8	7	9	9	13	14	8	4	135	27	96%	100%														
Percentage	18%	29%	68%	29%	29%	21%	32%	29%	25%	32%	32%	46%	50%	29%	14%	32%	28	28	28														
Blocks Tested	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	420	28	28	28														

# APPENDIX SIX, PLAY VERSE: KEY TO TABLES FOR 3,000-WORD PLAY VERSE TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	3 to 8
HC/20K: E	Hyphenated compound words per 20,000 words.	31 to 153
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	7 to 25
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 9 to 33 Late, fr. 1600: 15 to 57
Enclitics: P	Enclitic microphrases per 1000 lines.	27 to 89
Proclitics: P	Proclitic microphrases per 1000 lines.	265 to 476
with (2lws)	Rate of occurrence for <i>with</i> as the penultimate word of a sentence (per 1,000 sentences).	4 to 36
no / (no + not)	Ratio of the number of occurrences of <i>no</i> to that of <i>no</i> plus <i>not</i> combined, times 1000.	167 to 586
BoB5	Bundles of badges 5. See text for components.	116 to 556
BoB7	Bundles of badges 7. See text for components.	136 to 944
BoB8	Bundles of badges 8. See text for components.	-867 to -265
T-E Slope Test	Thisted-Efron Slope test.	-0.22 to 0.15
T-E New Word Test	Thisted-Efron New Word Test.	-32 to 21
T-E Rare Word Test	Thisted-Efron Rare Word Test.	-33 to 218
Bucket Block: G	Modal Bucket Score per Block.	-72 to 79
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Composite Probability	See Table 2. Probability that the observed rejections would occur by chance at Shakespeare's average rejection rate. Profile minimum probability is Shakespeare's lowest.	2.900E-01
Continuous Composite Probability	See Table 2. Probability that the observed composite probability score would occur by chance. Profile minimum probability is Shakespeare's lowest.	1.78300E-01
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 3,000-WORD PLAY VERSE BLOCKS

Four of Shakespeare's 82 baseline blocks (5%) have over one individual rejection in 13-15 tests. All of 38 blocks by others have two or more individual rejections in 13-15 tests. Discrete and continuous composite scoring, respectively, pass 95% and 84% of Shakespeare's blocks and reject 100% of others' blocks. Perhaps 2 of 38 others' blocks (5%) are close calls. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P= prosody.

Shakespeare Poems Baseline Data, Blocksize = 3,000

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no / (no+not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability	Continuous Composite Error	Continuous Composite Probability	
Venus	1	10	153	15	7	42	270	6	233	211	826	-593	-0.12	-32	467	14	1	3.084E-01	4.4067	1.4955E-01
	2	10	148	25	9	40	317	6	326	325	579	-536	-0.15	-26	281	14	0	1.000E+00	4.6346	8.9900E-02
	3	12	118	14	11	47	317	34	417	244	542	-419	-0.13	-7	1149	14	0	1.000E+00	4.0086	3.0919E-01
Lucrece	1	11	133	9	17	34	278	11	536	556	941	-405	-0.11	-20	358	14	0	1.000E+00	4.0782	2.7634E-01
	2	11	153	15	13	42	265	6	324	270	867	-580	-0.16	-8	535	14	0	1.000E+00	2.8607	8.7954E-01
	3	12	152	13	18	31	301	19	351	538	714	-541	-0.21	-20	969	14	0	1.000E+00	3.5536	5.5600E-01
	4	12	133	14	10	59	350	19	391	198	714	-609	-0.10	-2	994	14	0	1.000E+00	2.6074	9.4220E-01
5	11	114	13	21	65	338	17	500	262	529	-625	-0.08	-6	712	14	0	1.000E+00	3.1637	7.6153E-01	
Sonnets	1	14	98	12	19	77	334	15	184	429	818	-300	0.00	-1	842	14	0	1.000E+00	4.3033	1.8418E-01
	2	13	68	8	15	61	367	22	333	282	840	-560	-0.08	7	740	14	0	1.000E+00	2.7706	9.0550E-01
	3	13	88	3	18	43	316	7	500	478	944	-510	0.01	9	543	14	1	3.084E-01	3.9512	3.3764E-01
	4	12	50	8	15	48	321	7	333	288	611	-520	-0.14	6	601	14	0	1.000E+00	2.7801	9.0296E-01
	5	12	56	12	19	87	360	7	313	285	818	-560	0.07	-3	331	14	0	1.000E+00	3.7892	4.2399E-01
	6	12	104	7	17	81	476	12	290	116	826	-412	0.06	0	892	14	0	1.000E+00	4.5704	1.0452E-01

Discrete Discrimination Statistics

Rejections Percentage	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0
	0%	0%	7%	7%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	14

Aggregates

	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1%	0%	0%	14
																p96			

Composite Discrimination Statistics

	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	14
	0%	0%	14	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				

Poems Baseline: Standard Statistical Profile

Blocks Tested	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Mean	11.79	112.09	12.00	14.93	329.29	54.07	13.43	359.36	320.14	754.93	-512.14	-0.08	-7.33	672.60	12.23	261.02	9.0296E-01	3.7892	4.2399E-01
Std Dev	1.08	34.75	4.96	4.13	17.24	50.74	7.89	97.32	126.44	136.18	90.43	0.08	-32.28	281.21	9.16	1149.25	1.0432E-01	4.5704	1.0432E-01
Minimum	10.00	49.88	3.00	7.00	31.00	265.00	6.00	184.00	116.00	529.00	-625.00	-0.21	-32.28	281.21	9.16	1149.25	1.0432E-01	4.5704	1.0432E-01
Maximum	14.00	153.11	25.00	21.00	87.00	476.00	34.00	536.00	556.00	944.00	-300.00	0.07	9.16	1149.25	9.16	1149.25	1.0432E-01	4.5704	1.0432E-01

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no / (no-not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block
Global Min	10	31	7	9	27	265	4	167	136	-867	-0.22	-32	281
Global Max	14	153	25	57	89	476	36	536	944	-265	0.15	21	1149
Min to 1600			9	33									
Max to 1600			15	57									
Min from 1600			57										
Max from 1600													

Other Poets versus Shakespeare Baseline, Blocksize = 3,000

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Predclitics /1000 lines	with (2lvs)	no /no+not	BoB5	BoB7	BoB8	T-E Slope Test	T-E NW	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Alexander, Aurora	1	13	45	3	11		11	380	46	680	-350	-0.07	-74	1123	12	4	1.913E-04	7.0781	1.3420E-06
	2	19	70	4	9		8	385	-142	667	-280	-0.12	-99	1009	12	5	8.075E-06	11.4092	<1.000E-15
	3	13	56	4	8		12	438	107	765	-416	-0.07	-77	1697	12	5	8.075E-06	7.9651	5.2826E-09
Bacon Poems	1	12	21	2	6	18	149	286	617	760	-394	-0.13	-11	3159	14	7	2.347E-08	10.7113	<1.000E-15
	2	16	315	13	20		0	200	179	1000	-415	-0.26	-69	684	12	5	8.075E-06	9.0353	2.0095E-12
	3	13	207	12	13		11	308	473	875	-561	-0.02	-32	523	12	3	3.752E-02	5.5408	2.1880E-03
Burnfield	1	13	197	13	14		11	462	355	1000	-438	-0.13	-46	790	12	3	3.242E-03	4.7837	2.8729E-02
	2	12	80	12	7	5	210	241	261	1000	-553	-0.13	-40	476	14	5	1.954E-05	5.5950	5.0249E-03
	3	16	114	13	11	18	176	356	87	1000	-150	-0.11	-35	695	14	7	2.347E-08	7.6702	1.8782E-07
Barnes	1	6	88	19	18		4	333	120	714	-160	-0.24	-44	1037	12	4	1.913E-04	8.0893	2.2635E-09
	2	16	161	22	16		1	520	45	1000	133	-0.30	-69	847	12	8	9.414E-11	11.9386	<1.000E-15
	3	4	82	13	19		12	400	188	1000	23	-0.15	-47	806	12	4	1.913E-04	10.2305	<1.000E-15
	1	4	140	11	10		8	429	139	889	192	-0.22	-33	1986	12	4	1.913E-04	11.7822	<1.000E-15
	2	5	60	26	18		15	375	-7	1000	182	-0.19	-53	1115	12	6	2.494E-07	11.7339	<1.000E-15
	3	2	53	25	13		7	167	-167	385	-398	-0.17	-24	4650	12	3	3.242E-03	18.8566	<1.000E-15
	1	5	47	19	18		3	167	139	1000	11	-0.23	-85	857	12	6	2.494E-07	11.5756	<1.000E-15
	2	5	40	17	16		10	286	118	1000	10	-0.11	-65	884	12	4	1.913E-04	10.3760	<1.000E-15
	3	5	60	10	16		13	240	155	1000	0	-0.15	-24	848	12	3	3.242E-03	9.1388	8.7663E-13
Chapman, Hero	1	3	67	22	14		3	396	249	1000	-85	-0.22	-48	1238	12	6	2.494E-07	10.8761	<1.000E-15
	2	18	90	10	31	74	384	250	139	760	-583	-0.10	-45	952	14	2	5.000E-02	8.2274	5.0417E-09
	3	16	85	9	25	57	305	240	-111	692	-600	-0.19	-40	622	14	3	5.159E-03	6.7655	3.0547E-05
Daniel, Delia	1	16	36	7	33		11	400	308	571	-460	-0.10	-23	933	12	1	2.710E-01	6.7320	9.0825E-06
	2	14	79	4	31		0	360	357	818	-521	-0.11	-35	1044	12	3	3.242E-03	5.7589	9.1227E-04
Donne, Poems	1	13	68	11	13	9	173	500	-14	810	-521	-0.09	-10	1035	14	3	5.159E-03	5.5706	5.4873E-03
	2	12	17	11	17	18	133	462	147	1000	-579	0.01	2	810	14	4	3.710E-04	6.0162	9.7565E-04
	1	10	134	8	22		11	341	234	862	-132	-0.04	-95	907	12	2	3.752E-02	8.8381	9.4450E-12
	2	12	31	5	22		7	333	277	556	-211	-0.15	-56	1793	12	4	1.913E-04	7.7050	2.9435E-08
	3	14	55	5	26		0	347	239	440	-299	-0.02	-35	1508	12	4	1.913E-04	6.7963	6.4352E-06
Essex Poems	1	13	48	9	31		0	436	234	667	-173	-0.22	-52	421	12	3	3.242E-03	7.4868	1.1714E-07
	2	13	45	14	31		12	389	231	577	-222	-0.14	-61	1216	12	3	3.242E-03	7.5768	6.6707E-08
	3	13	91	8	25		5	176	268	528	-447	-0.06	-53	740	12	1	2.710E-01	5.5173	2.3959E-03
Drayton, Idea	1	13	53	7	29		0	377	160	588	-283	-0.12	-76	2044	12	3	3.242E-03	9.4100	9.4259E-14
	2	7	55	12	2		8	488	366	818	-402	0.05	-22	813	12	2	3.752E-02	6.3667	5.8592E-05
	3	13	86	8	4		0	333	227	778	-366	-0.08	-59	1069	12	3	3.242E-03	5.9962	3.2950E-04
Dyer Poems	1	14	8	1	9		8	395	387	1000	-525	0.10	12	655	12	3	3.242E-03	5.6300	1.5408E-03
	2	11	0	2	2		21	500	273	1000	-446	0.05	0	2092	12	5	8.075E-06	8.0145	3.7789E-09
E.C., Esq. Elegy	1	19	225	16	13		5	216	234	1000	-794	0.16	-57	634	12	5	8.075E-06	9.9119	1.2272E-15
	2	22	101	12	46	24	211	89	609	769	-888	-0.10	-24	789	14	6	7.749E-07	13.8556	<1.000E-15
Ford, Fume's Memorial	1	12	60	12	2		6	444	137	938	-562	0.06	-30	1672	12	2	3.752E-02	6.2435	1.0598E-04
	2	19	188	18	17	12	190	200	654	1000	167	-0.25	-112	495	14	10	1.287E-13	14.6295	<1.000E-15
	3	18	123	19	32	5	143	200	518	1000	265	-0.19	-67	943	14	7	2.347E-08	13.6335	<1.000E-15
Ford, Christ's Bloody Sweat	1	13	127	20	24	15	182	524	625	905	250	-0.19	-67	2045	14	6	7.749E-07	12.5270	<1.000E-15
	2	16	58	10	22	28	279	500	649	750	-229	-0.17	-5	682	14	4	3.710E-04	6.8393	2.0922E-05
	3	16	115	20	25	18	280	167	718	750	-326	-0.14	-26	1109	14	3	5.159E-03	7.2993	1.7048E-06
Greene Poems	1	11	31	17	27	21	241	343	695	935	-71	-0.09	-1	1384	14	5	1.954E-05	8.0851	1.3146E-08
	2	14	76	17	23	19	247	366	382	667	-364	-0.12	-16	659	14	2	5.000E-02	4.6547	8.5738E-02
	3	16	68	11	22	30	232	303	603	1000	-200	-0.11	-10	905	14	6	7.749E-07	7.0513	6.7977E-06
	1	12	71	3	11	0	139	525	292	789	-671	-0.18	-35	473	14	4	3.710E-04	6.5789	7.7215E-05
	2	13	54	12	17		21	455	336	854	-639	-0.21	-64	427	12	1	2.710E-01	5.8069	7.4659E-04
	3	12	116	7	11		14	541	296	882	-784	-0.25	-53	542	12	3	3.242E-03	5.8168	7.1611E-04

Other Poets versus Shakespeare Baseline, Blocksize = 3,000

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Precitics /1000 lines	with (2lws)	no (no+not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E NW	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability	
Griffin, Fidesa	1	4	62	15	7		6	325	165	955	-660	-0.01	-25	2085	12	4	1.913E-04	9.7730	4.1900E-15	
	2	5	63	13	12		19	477	114	949	-674	-0.13	-44	803	12	4	1.913E-04	7.8418	1.2042E-08	
Heywood, Oceano	1	9	223	23	4	20	194	0	258	1000	-439	-0.32	-50	667	14	10	1.287E-13	8.9599	3.7803E-10	
	2	9	192	26	4	12	154	17	152	909	-620	-0.26	-102	594	14	8	5.451E-10	10.6923	<1.0000E-15	
Heywood, Troia	1	16	156	18	16			7	229	536	818	-0.21	-45	840	12	4	1.913E-04	6.9117	3.4251E-06	
	2	21	53	21	8			9	478	569	667	-396	-0.10	-17	376	12	3	3.242E-03	9.5585	2.6856E-14
Jonson, selected	3	22	73	18	8			0	667	618	1000	-326	-0.10	-85	757	12	7	2.347E-08	12.7139	<1.0000E-15
	4	20	102	11	19			24	350	379	444	-527	-0.15	-51	806	12	2	3.752E-02	8.9333	4.4987E-12
Lodge, Rosalinde	3	39	6	22	5			5	308	478	818	-363	-0.02	-85	894	12	2	3.752E-02	7.7639	2.0085E-08
	10	92	10	7	3	188	7	379	160	1000	-361	-0.06	-16	1259	14	5	1.954E-05	6.1124	6.9025E-04	
Lovers Complaint	14	109	11	20	12	267	0	120	335	500	-452	-0.22	-33	572	14	4	3.710E-04	5.7917	2.4035E-03	
	1	9	42	8	18	51	298	16	292	1000	-238	-0.14	-16	975	14	3	5.159E-03	5.2643	1.5529E-02	
Marlowe, Hero and Leander	2	9	13	9	19	30	206	7	448	625	-383	-0.29	2	1072	14	4	3.710E-04	6.2782	3.1449E-04	
	1	9	0	1	12	20	204	18	203	1000	-263	0.17	-39	1717	14	10	1.287E-13	8.7715	1.0413E-10	
Merrittum	14	242	9	11	20			8	444	297	515	-0.25	-99	2076	12	4	1.913E-04	10.6522	<1.0000E-15	
	8	185	5	10				0	322	882	-475	-0.24	-72	1395	12	7	2.347E-08	8.6109	5.3230E-11	
Oxford Poems*	7	32	0	7	13	115		5	500	290	-301	-0.01	-9	2892	14	6	7.749E-07	11.9588	<1.0000E-15	
	10	63	2	10	14	225		18	444	479	-767	-0.20	-7	698	14	4	3.710E-04	5.9856	1.1074E-03	
Petele, Tale of Troy	1	9	27	9	33			7	476	498	1000	-451	0.12	-106	618	12	3	3.242E-03	10.3752	<1.0000E-15
	2	8	7	11	37			7	152	671	1000	-267	0.13	-104	1396	12	8	9.414E-11	12.2455	<1.0000E-15
P. Sidney, Astro	3	12	35	11	24			15	517	595	1000	-545	0.15	-110	1285	12	4	1.913E-04	10.2561	<1.0000E-15
	4	14	23	16	34			0	351	633	1000	-435	0.16	-73	1587	12	8	9.414E-11	9.7677	4.3952E-15
Raleigh Poems	1	12	58	15	10	30	190	0	347	338	905	-302	-0.15	-23	784	14	2	5.000E-02	5.0766	2.7669E-02
	2	20	71	15	16	16	201	0	333	200	1000	-586	-0.13	-12	1713	14	7	2.347E-08	10.9459	<1.0000E-15
Sackville, Mirror	23	18	3	24				11	667	212	1000	-657	-0.18	-87	1090	12	6	2.494E-07	13.6478	<1.0000E-15
Spenser, Amoretti	1	12	80	3	21			6	318	204	1000	-315	-0.07	-42	1011	12	3	3.242E-03	5.0821	1.1352E-02
	2	11	165	2	26			13	341	191	1000	-473	-0.01	-29	1377	12	4	1.913E-04	5.4702	2.8678E-03
M. Sidney, Psalms	10	81	12	24				6	444	443	1000	-271	-0.18	-67	2418	12	3	3.242E-03	9.5454	3.0031E-14
Wm. Smith, Chorus	1	7	146	6	19			9	304	157	1000	-342	-0.26	-47	649	12	6	2.494E-07	11.5259	<1.0000E-15
	2	8	45	16	17			12	512	258	1000	-32	-0.08	-27	792	12	3	3.242E-03	7.8642	1.0381E-08
Spenser, Amoretti	1	13	61	7	10	10	267		9	333	179	-301	-0.11	-34	643	14	3	5.159E-03	5.4006	9.9215E-03
	2	10	46	3	11			10	400	167	1000	-309	-0.09	-10	894	12	2	3.752E-02	4.6256	4.4871E-02
Warner, Albion's	3	12	41	4	14			8	160	205	1000	-293	0.00	-15	885	12	3	3.242E-03	4.8480	2.3746E-02
	13	142	17	24				0	345	303	1000	-386	0.18	-70	705	12	4	1.913E-04	8.3549	3.4846E-10
Webster, Poems	14	127	10	39				0	250	439	250	-377	-0.04	-113	1439	12	3	3.242E-03	11.9400	<1.0000E-15
Willibroe, Avisa	1	12	48	2	4			0	261	123	750	-742	0.16	-60	1529	12	6	2.494E-07	8.0936	2.1974E-09
2	11	22	2	4			0	328	329	448	-754	0.19	-34	1303	12	7	2.347E-08	7.4243	1.7223E-07	
Discrete Discrimination Statistics																			Composite Discrimination Statistics	
Rejections	42	23	25	19	22	22	24	8	23	42	27	18	57	28	380	12	87	87	87	
Percentages	48%	26%	29%	22%	76%	76%	28%	9%	26%	48%	31%	21%	66%	32%	34%	100%	100%	100%	100%	
Blocks Tested	87	87	87	87	87	87	87	87	87	87	87	87	87	87	1102	12	87	87	87	
Shakespeare Corpus Baseline: Consolidated Discrete Profile																			Composite Thresholds	
Grade Level	10	31	7	9	27	265	4	167	116	136	-867	-0.22	-32	281	12	6	2.494E-07	8.0936	2.1974E-09	
Global Min	14	153	25	9	89	476	36	536	556	944	-265	0.15	21	1149	12	7	2.347E-08	7.4243	1.7223E-07	
Global Max																				
Min to 1600																				
Max to 1600																				
Min from 1600																				
Max from 1600																				
Composite Discrimination Statistics																			Composite Thresholds	
Rejections	87	87	87	87	87	87	87	87	87	87	87	87	87	87	1102	12	87	87	87	
Percentages	48%	26%	29%	22%	76%	76%	28%	9%	26%	48%	31%	21%	66%	32%	34%	100%	100%	100%	100%	
Blocks Tested	87	87	87	87	87	87	87	87	87	87	87	87	87	87	1102	12	87	87	87	
Sh Discrete Rejection Profile (See note in key)																			Minimum	
Global Min																			0	
Global Max																			1	
Min to 1600																				
Max to 1600																				
Min from 1600																				
Max from 1600																				

\*OL, FE, enclitics, and precitics are 1-5 tests, comparing Oxford's 150-word block poem profile. On three of these Oxford scores below Shakespeare's 1500-word profile, but Open Lines barely fits it.

Other Poets versus Shakespeare Baseline, Blocksize = 3,000, Aggregate Analysis for Narrow Rejections

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no / (no+not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E NW	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Ford, Christ's Bloody Sweat	1	16	58	10	22	28	279	0	649	750	-229	-0.17	-5	682	14	4	3.710E-04	6.8393	2.0922E-05
	2	16	115	20	25	18	280	8	718	750	-326	-0.14	-26	1109	14	3	5.159E-03	7.2993	1.7048E-06
	3	11	31	17	27	21	241	5	343	695	-71	-0.09	-1	1384	14	5	1.954E-05	8.0851	1.3146E-08
	4	14	76	17	23	19	247	7	366	382	-364	-0.12	-16	659	14	2	5.000E-02	4.6547	8.5738E-02
	5	16	68	11	22	30	232	0	603	1000	-200	-0.11	-10	905	14	6	7.749E-07	7.0513	6.7997E-06
Averages	14.60	69.69	15.00	23.80	23.20	255.80	4.00	335.80	609.40	820.40	-238.00	-0.13	-11.72	947.79	Aggregate Values			13.4588	<1.0000E-15
Std. Errors	5.82	-2.73	1.35	4.80	-4.00	-3.24	-2.67	-0.54	5.12	1.08	6.78	-1.22	-0.80	2.36	14	20	1.887E-15	10.9459	<1.0000E-15
Raleigh Poems	1	12	58	15	10	30	190	0	347	338	-302	-0.15	-23	784	14	2	5.000E-02	5.0766	2.7669E-02
	2	20	71	15	16	16	201	0	333	200	-56	-0.13	-12	1713	14	7	2.347E-08	10.9459	<1.0000E-15
Averages	16.00	64.75	15.00	13.00	23.00	195.50	0.00	340.00	269.00	952.50	-179.00	-0.14	-17.68	1248.50	Aggregate Values			10.2677	<1.0000E-15
Std. Errors	5.51	-1.93	0.86	-0.66	-2.55	-3.73	-2.41	-0.28	-0.57	2.05	5.21	-1.01	-1.20	3.12	14	9	2.394E-08	5.4006	9.9215E-03
Spenser, Amoretti	1	13	61	7	10	10	267	9	333	179	-301	-0.11	-34	643	14	3	5.159E-03	5.4006	9.9215E-03
	2	10	46	3	11	54.07	329.29	10	400	167	-309	-0.09	-10	894	12	2	3.752E-02	4.6256	4.4871E-02
	3	12	41	4	14	17.24	50.74	8	205	1000	-293	0.00	-15	885	12	3	3.242E-03	4.8480	2.3746E-02
Averages	11.67	49.48	4.67	11.67	10.00	267.00	9.00	297.67	183.67	1000.00	-301.00	-0.07	-19.54	807.30	Aggregate Values			8.8284	6.8053E-11
Std. Errors	-0.19	-3.12	-2.56	-1.37	-4.43	-2.13	-0.97	-1.10	-1.87	3.12	4.04	0.31	-1.73	0.89	14	8	5.080E-06	8.8284	6.8053E-11

Poems Baseline: Standard Statistical Profile

Blocks Tested	14	14
Mean	11.79	12.00
Std Dev	1.08	4.96
Minimum	10.00	49.88
Maximum	14.00	153.11

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no / (no+not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block
Global Min	10	31	7	9	27	265	4	167	136	-867	-0.22	-32	281
Global Max	14	153	25	57	89	476	36	536	944	-265	0.15	21	1149
Min to 1600													
Max to 1600													
Min from 1600													
Max from 1600													

# APPENDIX SIX, POEMS: KEY TO TABLES FOR 3,000-WORD POEM TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	10 to 14
HC/20K: E	Hyphenated compound words per 20,000 words.	31 to 153
Relative Clauses	Total relative clauses per 1,000 words.	7 to 17 (not shown)
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	7 to 25
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 9 to 33 Late, fr. 1600: 15 to 57
Enclitics: P	Enclitic microphrases per 1000 lines.	27 to 89
Proclitics: P	Proclitic microphrases per 1000 lines.	265 to 476
with (2lws)	Rate of occurrence for <i>with</i> as the penultimate word of a sentence (per 1,000 sentences).	4 to 36
no / (no + not)	Ratio of the number of occurrences of <i>no</i> to that of <i>no</i> plus <i>not</i> combined, times 1000.	167 to 536
BoB5	Bundles of badges 5. See text for components.	116 to 556
BoB7	Bundles of badges 7. See text for components.	136 to 944
BoB8	Bundles of badges 8. See text for components.	-867 to -265
T-E Slope Test	Thisted-Efron Slope test.	-0.22 to 0.15
T-E New Word Test	Thisted-Efron New Word Test.	-32 to 21
Modal Block: G	Modal Score per Block.	281 to 1149
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Comp. Prob.	See Table 2. Probability that observed rejections would occur by chance at Sh's avg. rejection rate.	3.084E-01
Continuous Comp. Prob.	See Table 2. Prob. that observed comp. probability score would occur by chance, Sh. lowest	8.9660E-02
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite Shakespeare rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 3,000-WORD POEM BLOCKS

Only 2 of 14 Shakespeare baseline poem blocks (14%) have even one individual rejection in 14 tests. Only 3 of 87 poem blocks by others (3%) have fewer than two individual rejections in 12 tests. Both discrete and continuous composite scoring pass 100% of Shakespeare's blocks and reject 100% of others' blocks. 3% are close calls, but most composite rejection scores are not close at all. *A Lover's Complaint* and Marlowe's most Shakespeare-distant block have four rejections each and are hundreds of times less likely to have come from Shakespeare by chance than Shakespeare's least typical baseline block. *Funeral Elegy by W.S.* and the poems of Bacon and the Earl of Oxford have 6-7 rejections each and are trillions of times less likely than Shakespeare's own outlier to be his. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = Prosody.



Shakespeare Play Verse Baseline Data, Blocksize = 3,000

Play and Block	Date Late	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2ws)	no (no+not)	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rare Words	T-E New Words	Buckets Block	Number of Tests	Discrete Rejections	Discrete Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Richard III	1	1593	6	107	14	18	29	324	13	333	366	571	-778	0.06	67	9	17	15	0	1.000E+00	9.8897E-01
	2		5	86	16	22	40	320	12	262	273	548	-698	0.02	81	5	10	15	0	1.000E+00	1.7817
	3		5	40	12	22	43	343	0	262	483	737	-537	0.01	120	19	1	15	0	3.264E-01	9.9943E-01
	4		5	80	16	15	38	359	19	348	350	765	-467	0.05	188	3	55	15	0	1.000E+00	3.6044
	5		7	34	22	22	34	342	22	344	411	517	-636	-0.02	146	15	-13	15	1	3.264E-01	7.1469E-01
	6		7	79	17	14	47	364	5	382	499	714	-640	0.00	71	11	29	15	0	1.000E+00	8.4557E-01
	7		5	120	17	17	27	374	15	188	188	959	-634	-0.11	35	8	-54	15	0	1.000E+00	6.0177E-01
	8		6	111	17	16	58	403	16	289	297	872	-634	0.01	117	-5	8	15	0	1.000E+00	3.6501
	9		5	78	15	13	65	370	7	321	371	818	-557	-0.03	48		25	15	0	1.000E+00	5.7735E-01
Richard II	1	1595	8	78	11	20	48	292	6	333	466	852	-432	-0.05	46	-11	-63	15	0	1.000E+00	3.0508
	2		8	97	9	19	36	304	22	400	417	824	-678	-0.04	-24		-99	15	0	1.000E+00	4.0388
	3		7	77	12	23	46	274	5	236	514	671	-265	-0.10	106	0	-2	15	0	3.264E-01	3.6163E-01
	4		7	78	8	23	47	284	1	242	458	941	-618	0.04	27	6	-1	15	1	1.000E+00	4.6932
	5		7	85	9	28	42	317	11	357	466	829	-738	-0.02	84	8		15	1	3.264E-01	3.5108E-01
Romeo	6		5	84	7	21	63	341	13	423	340	722	-667	-0.07	89	9	19	15	0	1.000E+00	4.1163
	7		5	73	7	19	66	353	0	250	321	692	-781	-0.06	156	-1	29	15	0	1.000E+00	3.2222E-01
	1	1596	5	145	6	14	34	428	12	282	197	524	-610	0.04	55	-10	-29	15	1	3.264E-01	3.1786
	2		4	142	7	19	39	396	15	184	128	405	-596	0.05	44		33	15	1	1.000E+00	3.6082
	3		5	102	8	16	88	424	12	233	192	667	-779	0.03	109	4	-107	15	1	3.264E-01	4.0280
	4		4	119	7	14	59	450	18	357	241	804	-659	0.02	104	-5	-180	15	1	3.264E-01	3.9139
	5		4	67	12	12	50	459	22	197	199	800	-643	0.13	257	4		15	1	3.264E-01	5.2633
1 Henry IV	6		4	105	11	16	23		13	325	236	500	-857	-0.04	104	-16	64	13	0	1.000E+00	2.3508E-02
	7		5	63	10	23			15	300	186	787	-748	0.09	100	8	3	15	1	3.264E-01	3.3019E-04
	1	1597	10	140	12	33	38	347	29	382	441	895	-511	-0.03	13	-18	7	13	1	1.000E+00	5.6954
	2		7	126	12	26	41	381	11	302	283	892	-594	-0.03	53	-32	18	13	0	1.000E+00	3.4575
	3		7	99	10	30	26	238	6	238	466	892	-671	0.01	26	8	13	13	0	1.000E+00	6.2075E-01
	4		7	50	11	28	29	395	26	255	333	704	-721	0.04	135	11	31	13	0	1.000E+00	5.0975
	1	1601	7	54	19	29	29	393	22	256	447	238	-640	-0.03	81	-26	73	13	0	1.000E+00	8.6181E-01
Hamlet	2		5	60	16	27	9	254	9	254	443	588	-867	-0.03	37	-44	79	13	1	2.900E-01	3.4747
	3		7	40	16	25	11	370	11	370	461	351	-778	-0.16	81	-13	13	13	0	1.000E+00	3.3947
	4		7	60	13	32	32	325	22	325	424	208	-659	0.06	6	-16	3	13	0	1.000E+00	3.2857
	5		5	27	12	26	9	280	9	280	453	396	-705	-0.02	23	-21	14	13	0	1.000E+00	3.9526
	6		6	86	14	30	30	289	10	289	350	743	-723	-0.09	33	-32	5	13	0	1.000E+00	3.3385
	7		4	46	14	21			10	385	300	784	-810	0.02	37	-3	49	13	0	1.000E+00	2.9690
	1	1602	9	86	15	32	38	347	11	250	415	586	-586	-0.24	-154	-39	-71	15	4	2.900E-01	8.6977E-01
Troilus	2		9	66	17	38	41	381	29	294	448	489	-692	-0.06	-25	-28	7	15	1	3.264E-01	2.4494
	3		6	73	18	29	27	261	27	261	459	512	-634	-0.11	17	-8	14	13	0	1.000E+00	6.0652
	4		5	48	15	20	49	395	22	353	350	472	-678	-0.06	45	-16	7	15	0	1.000E+00	3.5763E-01
	5		5	66	14	21	29	393	18	216	186	404	-795	-0.08	66		1	15	0	1.000E+00	9.2630E-01
	1	1603	6	40	20	33	33	381	24	189	420	378	-544	0.06	105	-4	-42	13	0	1.000E+00	2.3641
Measure	2		6	41	22	37	23	304	24	304	384	208	-653	-0.04	121	-1	25	13	0	1.000E+00	2.7991
	3		5	40	17	30	27	353	7	353	381	563	-765	-0.04	73	-15	21	13	0	1.000E+00	3.2497
	4		6	68	20	37	21	378	21	378	356	423	-646	-0.04	154	-5	37	13	0	1.000E+00	2.8593
	1	1604	6	75	18	33	33	370	20	195	270	412	-584	0.00	65	-27	-9	13	0	1.000E+00	2.4022
Othello	2		6	74	17	26	26	167	15	167	237	429	-769	-0.03	52	-16	2	13	0	1.000E+00	9.1855E-01
	3		5	37	17	27	11	234	246	234	246	136	-691	0.13	142	-5	15	13	0	1.000E+00	2.2844
	4		4	31	17	25	18	232	117	232	117	51	-820	0.01	121	-11	-17	13	0	1.000E+00	9.7006E-01
	5		3	31	17	18	20	260	212	260	212	231	-747	0.10	159	-2	3	13	0	1.000E+00	2.5625
	6		2	25	15	17	18	350	150	350	150	233	-798	-0.01	215	20	14	13	2	2.900E-01	4.5174E-01
	1	1605	2	25	15	17	18	350	150	350	150	233	-798	-0.01	215	20	14	13	2	2.900E-01	3.9961

Shakespeare Play Verse Baseline Data, Blocksize = 3,000

Play and Block	Date Late	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no /no+no0	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rare Words	T-E New Words	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability	
Lear	1	1605	6	73	21	33	30	309	18	313	224	538	-474	-0.12	27	1	-28	15	0	1.000E+00	2.0450	9.9708E-01
	2		5	80	17	33			7	340	297	235	-511	-0.01	27	-16	9	13	0	1.000E+00	2.0404	9.8933E-01
	3		4	159	19	30			32	328	307	268	-526	-0.06	86	-29	7	13	1	2.900E-01	3.9762	2.5953E-01
	4		4	100	19	30			9	250	320	484	-586	-0.06	-46	-18	46	13	0	1.000E+00	2.1995	9.7859E-01
	5		4	100	16	32	29	323	10	245	305	500	-539	0.07	90	-5	1	15	0	1.000E+00	1.5053	9.9993E-01
Macbeth	1	1606	6	79	22	39			4	314	645	722	-353	0.02	10	-28	12	13	1	2.900E-01	4.4063	1.1077E-01
	2		4	91	19	33			30	250	454	184	-371	-0.12	41	-8	49	13	0	1.000E+00	3.8190	3.3399E-01
	3		4	87	13	34			13	206	450	333	-340	-0.03	21	-17	22	13	0	1.000E+00	3.0901	7.3035E-01
	4		5	117	20	37			11	291	351	500	-631	-0.07	27	-9	22	13	0	1.000E+00	1.9494	9.9314E-01
	1	1607	5	47	19	40	63	393	36	255	474	231	-325	-0.06	33	-20	-6	15	0	1.000E+00	4.4538	1.7830E-01
Antony	2		6	130	22	41	49	299	23	283	314	263	-316	-0.10	41	-23	14	15	0	1.000E+00	3.7126	5.4202E-01
	3		4	67	15	32	77	410	3	265	262	280	-524	-0.04	101	-14	32	15	1	3.264E-01	3.3306	7.4598E-01
	4		5	73	19	45	82	269	11	208	467	371	-487	-0.04	55	-38	8	15	1	3.264E-01	4.0543	3.5503E-01
	5		4	60	15	42			20	323	370	378	-769	-0.06	82	-30	11	13	0	1.000E+00	2.6912	8.8922E-01
	6		4	47	16	43			24	385	173	474	-580	0.06	106	-4	6	13	0	1.000E+00	3.2432	6.5110E-01
	7		4	36	12	45			13	375	250	693	-600	-0.09	20	-9	19	13	0	1.000E+00	3.0254	7.6129E-01
	1	1610	5	63	20	47	48	286	14	289	336	720	-478	-0.08	82	-2	-32	15	0	1.000E+00	2.6724	9.5360E-01
Cymbeline	2		5	54	21	53	37	319	14	346	271	309	-495	0.00	36	-12	0	15	0	1.000E+00	2.6430	9.5805E-01
	3		5	102	24	51	40	278	14	347	300	440	-525	-0.06	18	-13	1	15	0	1.000E+00	2.9513	8.9218E-01
	4		4	90	17	42			16	250	306	155	-604	0.01	50	-7	17	15	0	1.000E+00	2.9355	8.9096E-01
	5		4	61	25	43	38	311	22	357	289	289	-506	-0.10	59	-18	17	15	0	1.000E+00	3.1711	8.1621E-01
Tempest	6		5	41	19	43	51	324	7	357	296	217	-236	-0.10	23	-1	15	1	3.264E-01	3.7764	5.0582E-01	
	7		5	62	17	46	38	301	8	167	252	700	-429	0.03	61	-23	-23	15	1	3.264E-01	3.6628	5.7019E-01
	1	1611	6	114	22	49	89	358	13	327	126	0	-295	-0.13	-11	-32	15	1	3.264E-01	5.2157	2.7121E-02	
Winter's	2		4	67	22	43	83	265	10	583	166	409	-535	-0.06	73	-4	19	15	0	1.000E+00	5.4390	1.2621E-02
	3		6	109	22	46	50	322	4	351	183	412	-488	-0.26	-24	-40	16	15	3	6.358E-03	6.2279	6.8958E-01
	4		6	84	23	46	82	332	4	273	189	625	-547	-0.07	37	-4	18	15	0	1.000E+00	3.5470	6.3461E-01
	1	1611	5	150	23	42			7	313	347	348	-634	-0.23	27	-33	-40	13	2	4.360E-03	4.5600	7.5983E-02
Winnetka	2		6	94	21	50			21	288	262	170	-267	0.05	92	-2	6	13	0	1.000E+00	3.7385	3.7551E-01
	3		6	44	23	48			14	250	282	235	-448	-0.07	90	-9	-14	13	0	1.000E+00	3.0447	7.5224E-01
	4		6	87	23	53			4	286	233	514	-556	-0.15	112	-2	30	13	0	1.000E+00	3.5420	4.8348E-01
	5		5	79	17	50			15	250	319	600	-642	-0.01	161	1	-26	13	0	1.000E+00	2.6872	8.9040E-01
	6		5	56	19	45			30	275	272	455	-425	-0.10	98	4	32	13	0	1.000E+00	3.1948	6.7695E-01
	1	1611	5	150	23	42			7	313	347	348	-634	-0.23	27	-33	-40	13	2	4.360E-03	4.5600	7.5983E-02

Discrete Discrimination Statistics

Rejections Percentage	4 5%	4 5%	2 2%	0 0%	0 0%	0 0%	5 6%	5 6%	0 0%	1 1%	2 2%	1 1%	3 4%	2 2%	7 9%	4 5%	Aggregates
	4	4	2	0	0	0	5	5	0	1	2	1	3	2	7	4	13
	5%	5%	2%	0%	0%	0%	6%	6%	0%	1%	2%	1%	4%	2%	9%	5%	16%
																	82

Poems Baseline: Standard Statistical Profile

Blocks Tested	82	82	82	82	42	42	82	82	82	82	82	82	82	82	82	82
Mean	5.44	78.36	16.09	30.82	49.52	345.34	14.56	294.39	325.79	506.52	-592.26	-0.03	68.36	-8.20	2.47	2.47
Std Dev	1.36	33.28	4.63	11.42	17.11	49.30	8.00	67.11	109.21	229.08	146.66	0.07	57.97	15.57	38.77	38.77
Minimum	2.00	24.59	6.00	12.00	26.53	268.71	0.00	167.00	117.00	0.00	-867.00	-0.26	-154.16	-44.00	-180.43	-180.43
Maximum	10.00	198.79	25.00	53.00	89.39	458.75	36.00	583.00	645.00	941.00	-236.00	0.13	257.00	41.00	78.84	78.84

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	with (2lws)	no /no+no0	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rare Words	T-E New Words	Buckets
Global Min	3	31	7	27	265	4	167	116	136	-867	-0.22	-33	-32	-72
Global Max	8	153	25	57	89	476	36	583	944	-265	0.15	218	21	79
Min to 1600			7	9										
Max to 1600			17	33										
Min from 1600			12	15										
Max from 1600			25	57										



APPENDIX SEVEN, PLAY VERSE: KEY TO TABLES FOR  
1,500-WORD PLAY VERSE TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	4 to 9
HC/20K: E	Hyphenated compound words per 20,000 words.	24 to 243
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	3 to 29
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 8 to 33 Late, fr. 1600: 13 to 55
Enclitics: P	Enclitic microphrases per 1000 lines.	18 to 123
Proclitics: P	Proclitic microphrases per 1000 lines.	235 to 561
Bob5	Bundles of badges 5. See text for components.	93 to 761
BoB7	Bundle of badges 7. See text for components.	0 to 1000
BoB8	Bundle of badges 8. See text for components.	-889 to -209
T-E Slope Test	Thisted-Efron Slope Test.	-0.22 to 0.15
T-E New Word Test	Thisted-Efron New Word Test.	-24 to 12
T-E Rare Word Test	Thisted-Efron Rare Word Test.	-40 to 116
Bucket Block: G	Modal Bucket Score per Block.	-77 to 100
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Comp. Probability	See Table 2. Probability that observed rejections would occur by chance at Sh.'s avg. rejection rate.	2.710E-01
Continuous Comp. Probability	See Table 2. Prob. that observed comp. probability score would occur by chance, Sh. lowest.	1.2386E-01
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = composite non-rejection.	

SUMMARY OF RESULTS FOR 1500-WORD PLAY VERSE BLOCKS

Only 5 of 140 Shakespeare baseline poem blocks (4%) have more than one individual rejection in 11-13 tests. Thirty-eight of forty-three non-Shakespeare blocks (88%) have more than one rejection. As sample size gets smaller, more overlap and close calls appear, including 4% false negatives and 12% false positives for discrete rejections. Stated differently, of 183 blocks tested, the computer correctly discriminated between Shakespeare and non-Shakespeare (95%) of the time (173 blocks). But roughly half of the rejections for this block size could be considered close calls. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.

Shakespeare Poems Baseline Data, Blocksize = 1,500

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Prolitics /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability	
Venus	1	10	195	11	8	22	199	255	857	-478	-0.19	-4	79	12	1	2.710E-01	4.2124	1.2368E-01
	2	10	100	17	7	63	333	174	778	-678	-0.12	-28	188	12	1	2.710E-01	4.1950	1.2845E-01
	3	10	115	23	7	22	349	306	583	-530	-0.10	-7	135	12	0	1.000E+00	3.7221	3.1013E-01
	4	10	168	18	10	52	292	346	571	-543	-0.15	-19	82	12	0	1.000E+00	3.6467	3.4773E-01
	5	12	151	15	10	46	301	149	652	-333	-0.19	-10	174	12	0	1.000E+00	2.9725	7.1689E-01
	6	13	76	10	13	41	275	327	440	-500	-0.13	3	575	12	1	2.710E-01	3.6178	3.6264E-01
Lucrece	1	15	120	7	22	31	276	595	846	-508	-0.22	-17	208	12	0	1.000E+00	3.9762	2.0009E-01
	2	10	132	9	12	37	298	525	1000	-286	-0.11	-3	194	12	0	1.000E+00	3.1703	6.1150E-01
	3	12	145	17	13	36	250	277	800	-467	-0.24	-3	80	12	1	2.710E-01	3.1470	6.2442E-01
	4	10	160	12	19	48	282	260	1000	-722	-0.16	-5	322	12	0	1.000E+00	3.0737	6.6430E-01
	5	11	199	13	10	26	235	671	777	-625	-0.19	-19	198	12	0	1.000E+00	4.5329	5.7418E-02
	6	12	106	13	12	37	372	412	647	-476	-0.21	-1	264	12	0	1.000E+00	2.1625	9.6792E-01
Sonnets	7	10	125	13	19	26	327	121	733	-600	-0.05	-4	243	12	0	1.000E+00	2.5127	8.9945E-01
	8	15	128	11	17	82	372	271	666	-619	-0.10	3	560	12	1	2.710E-01	3.6277	3.5750E-01
	9	13	81	13	24	58	381	226	750	-800	-0.06	-7	311	12	0	1.000E+00	3.3112	5.3200E-01
	10	10	148	5	18	65	305	298	333	-500	-0.08	1	160	12	0	1.000E+00	3.3820	4.9181E-01
	1	13	142	8	18	92	372	500	777	-321	-0.01	-2	310	12	0	1.000E+00	3.0759	6.6312E-01
	2	16	53	14	20	82	396	371	846	-277	0.00	1	325	12	0	1.000E+00	4.1548	1.3999E-01
Sonnets	3	14	75	7	17	92	321	141	800	-455	0.02	9	218	12	0	1.000E+00	3.3666	5.0033E-01
	4	13	62	8	14	56	342	403	867	-689	-0.08	-2	338	12	0	1.000E+00	2.1432	9.7020E-01
	5	13	102	3	17	31	306	470	895	-581	0.00	0	373	12	0	1.000E+00	2.8286	7.8805E-01
	6	13	87	2	18	46	286	486	1000	-455	0.01	9	407	12	1	2.710E-01	3.6882	3.4187E-01
	7	11	101	12	13	56	286	284	579	-572	-0.08	5	207	12	0	1.000E+00	1.8892	9.9002E-01
	8	3	12	12	7	36	347	293	647	-455	-0.14	1	234	12	1	2.710E-01	3.0796	6.6113E-01
	9	13	63	16	23	31	372	385	556	-408	-0.08	-5	152	12	0	1.000E+00	3.2472	5.6832E-01
	10	12	49	4	15	122	306	180	1000	-769	0.07	2	329	12	0	1.000E+00	4.7490	3.1770E-02
	11	12	104	7	17	87	480	116	826	-412	0.06	-2	202	12	0	1.000E+00	4.1331	1.4652E-01

Discrete Discrimination Statistics

Rejections Percentage	0	1	4%	1	0	0%	1	0	0%	1	4%	1	2	7
	0	0%	4%	0%	0%	0%	0%	0%	0%	0%	4%	4%	7%	27

Aggregates

	0	1	2	7
Blocks Tested	0	1	2	324

Poems Baseline: Standard Statistical Profile

Blocks Tested	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	12.04	111.18	10.75	15.19	52.56	320.75	327.48	749.11	-519.26	-0.09	-3.87	254.45		
Std Dev	1.71	44.18	5.06	4.64	25.32	56.13	142.95	168.06	137.70	0.08	8.41	123.24		
Minimum	10.00	12.44	2.04	7.00	21.51	198.92	116.00	333.00	-800.00	-0.24	-28.44	78.60		
Maximum	16.00	199.47	22.58	24.00	122.45	479.59	671.00	1000.00	-277.00	0.07	8.77	574.81		

Composite Discrimination Statistics

	0	1	2
	0	0%	7%
	27	27	27

Composite Thresholds

	2.710E-01	1.2368E-01
Sh Discrete Rejection Profile (See note in key)		
Minimum	0	0
Maximum	1	1

Shakespeare Corpus Baseline: Consolidated Discrete Profile

	Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Prolitics /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block
Global Min	10	24	3	7	18	235	93	0	-889	-0.22	-24	79
Global Max	16	243	29	24	123	561	671	1000	-209	0.15	12	407
Min to 1600				7				188				
Max to 1600				24				1000				
Min from 1600				13				0				
Max from 1600				23				1000				

Other Poets versus Shakespeare Baseline, Blocksize = 1,500

Poem and Block	Grade Level	HWC /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Bac15k-1	12	0	6	7	10	230	628	1000	-409	-0.01	3	1039	12	4	1.913E-04	8.0744	2.5081E-09
Gre15k-1	9	93	5	13	0	118	315	625	-533	-0.18	-17	237	12	3	3.242E-03	5.1119	1.0283E-02
Gre15k-2	16	96	2	9	0	142	278	909	-755	-0.18	-19	314	12	3	3.242E-03	5.7573	9.1834E-04
Ddel15k-1	12	94	14	26	16	109	9	600	-400	-0.13	-8	221	12	4	1.913E-04	5.4159	3.5163E-03
Ddel15k-2	13	53	15	28	5	308	-76	1000	-686	-0.09	-2	598	12	4	1.913E-04	5.7851	8.1803E-04
Barnes15k-1	6	55	21	17	19	211	295	0	-136	-0.16	-14	410	12	5	8.075E-06	7.4430	1.5354E-07
Barnes15k-2	7	122	16	19	0	133	-133	1000	-182	-0.24	-30	266	10	5	2.684E-06	8.3963E-06	8.886E-02
Mhe15k-1	9	38	9	22	59	307	308	1000	-253	-0.23	-15	320	12	2	3.752E-02	4.3572	8.886E-02
Mhe15k-2	8	34	11	27	43	286	279	1000	-240	-0.14	-1	325	12	2	3.752E-02	4.7791	2.9117E-02
Oxi15t	8	31	0	7	13	115	257	1000	111	-0.01	-2	1209	12	6	2.494E-07	10.8081	<1.0000E-15
Idea15k-1	7	81	10	9	33	207	285	733	-321	-0.10	-9	324	12	2	3.752E-02	4.3057	1.0028E-01
Idea15k-2	7	27	11	7	7	454	454	833	-569	0.05	-14	460	10	2	2.648E-02	4.8591	8.7031E-03
Nash15k-1	7	69	5	14	36	350	342	846	-684	-0.23	-34	359	12	3	3.242E-03	5.4343	3.2830E-03
Span15k-1	12	107	10	14	10	356	291	1000	-184	-0.09	-18	241	12	2	3.752E-02	3.7628	2.9069E-01
Span15k-2	14	27	9	6	10	168	67	1000	-418	-0.11	-17	282	12	4	1.913E-04	5.2668	6.0390E-03
Fid15k-1	5	62	17	8	25	278	294	1000	-557	0.00	-8	868	12	2	3.752E-02	7.2442	5.094E-07
Fid15k-2	3	62	13	5	45	45	45	935	-755	-0.01	-17	816	10	4	8.462E-05	8.1446	2.2500E-10
Che15k-1	20	67	13	28	45	392	346	1000	-364	-0.24	-23	154	12	3	3.242E-03	6.6905	1.1315E-05
Che15k-2	16	117	16	32	117	447	-83	647	-826	-0.10	-22	434	12	3	3.242E-03	7.1604	8.342E-07
Midg15k-1	11	411	13	8	10	177	365	250	-632	-0.23	-59	344	12	5	8.075E-06	10.7083	<1.0000E-15
Midg15k-2	14	134	8	11	18	279	306	875	-486	-0.25	-39	281	12	2	3.752E-02	5.2063	7.4613E-03
Che15t	13	137	0	6	6	321	321	625	-675	-0.26	-31	205	10	4	8.462E-05	5.0281	4.8362E-03
Fiam15k-1	20	192	25	17	15	200	644	1000	-200	-0.30	-70	126	12	6	2.494E-07	10.9790	<1.0000E-15
Fiam15k-2	19	309	11	17	665	665	665	1000	680	-0.25	-42	117	10	5	2.684E-06	12.0711	<1.0000E-15
Don15k-1	11	206	8	23	45	290	319	765	26	-0.17	-70	294	12	2	3.752E-02	9.3608	1.4212E-13
Don15k-2	9	68	8	20	126	126	126	1000	-297	-0.04	-25	491	10	3	1.839E-03	4.7441	1.2722E-02
Burton Anat	8	31	21	7	200	200	200	1000	-750			422	8	3	8.922E-04	4.8747	2.5114E-03

Discrete Discrimination Statistics

Rejections Percentage	16	3	3	11%	27	27	27	27	27	27	27	27	27	27	27	27	27
Blocks Tested	59%	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Aggregates																	

Composite Discrimination Statistics

Rejections Percentage	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Blocks Tested	100%	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E New Words	Modal Block	
Global Min	10	24	3	7	18	234.693878	93	0	-889	-0.22	-24	79
Global Max	16	243	29	24	123	561	671	1000	-209	0.15	12	407
Min to 1600				7				188				
Max to 1600				24				1000				
Min from 1600				13				0				
Max from 1600				23				1000				

Sh Discrete Rejection Profile (See note in key)	0	1
Minimum	0	1
Maximum	0	1

Composite Thresholds

Discrete	2.710E-01	1.2368E-01
Continuous		

# APPENDIX SEVEN, POEMS: KEY TO TABLES FOR 1,500-WORD POEM TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	10 to 16
HC/20K: E	Hyphenated compound words per 20,000 words.	24 to 243
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	3 to 29
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 7 to 24 Late, fr. 1600: 13 to 23
Enclitics: P	Enclitic microphrases per 1000 lines.	18 to 123
Proclitics: P	Proclitic microphrases per 1000 lines.	235 to 561
Bob5	Bundles of badges 5. See text for components.	93 to 761
BoB7	Bundle of badges 7. See text for components.	0 to 1000
BoB8	Bundle of badges 8. See text for components	-889 to -209
T-E Slope Test	Thisted-Efron Slope Test.	-0.22 to 0.15
T-E New Word Test	Thisted-Efron New Word Test.	-24 to 12
Modal Block: G	Modal Score per Block.	79 to 407
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Composite Probability	See Table 2. Probability that observed rejections would occur by chance at Sh.'s avg. rejection rate.	2.710E-01
Continuous Composite Probability	See Table 2. Prob. that observed comp. probability score would occur by chance, Sh.'s lowest block.	1.2386E-01
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 1500-WORD POEM BLOCKS

Only 7 of 27 Shakespeare baseline poem blocks (26%) have even one individual rejection in 12 tests. None of 27 blocks of poems by others have fewer than two individual rejections in 12 tests. Both discrete and continuous composite scoring pass 100% of Shakespeare's blocks and reject 96-100% of others' blocks. Perhaps a quarter could be considered close calls, but most, including Oxford, Bacon and Marlowe, could not. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.

Shakespeare Play Verse Baseline Data, Blocksize = 1,500

Play and Block	Date Late	Words	Lines	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Exclites /1000 lines	Proclites /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rate Words	T-E New Words	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Richard III	1593	1494	198	8	134	9	27	10	318	426	500	-841	-0.17	25	0	23	13	1	2.900E-01	3.3368	5.9957E-01
		1496	192	5	80	16	24	47	281	276	667	-704	0.06	42	8	8	13	0	1.000E+00	2.4638	9.4350E-01
		1509	190	6	53	12	19	37	300	243	500	-520	-0.06	48	1	30	13	0	1.000E+00	1.4088	9.9978E-01
		1508	183	5	106	20	14	44	322	310	600	-945	0.02	33	4	12	13	1	2.900E-01	3.1232	7.1389E-01
		1497	187	6	40	13	24	37	332	579	571	-647	-0.10	34	3	9	13	0	1.000E+00	2.6031	9.1332E-01
		1486	184	5	40	11	20	49	337	388	833	-439	0.01	86	10	59	13	0	1.000E+00	2.8933	8.1861E-01
		1496	182	5	107	18	15	66	418	700	515	-700	0.01	78	-2	58	13	0	1.000E+00	2.8735	8.3646E-01
		1521	187	4	26	14	16	11	337	379	857	-438	0.05	111	5	142	13	2	4.360E-02	4.9918	2.3663E-02
		1463	177	5	27	23	18	34	407	430	278	-814	0.04	98	12	9	13	0	1.000E+00	4.2632	1.5999E-01
		1517	190	7	40	21	19	21	284	392	667	-467	-0.02	47	3	13	13	0	1.000E+00	3.0226	7.6299E-01
		1493	193	9	54	19	16	47	383	573	692	-385	-0.15	23	3	52	13	0	1.000E+00	4.0392	2.3253E-01
		1555	193	6	90	14	12	47	342	460	750	-500	0.00	48	8	56	13	0	1.000E+00	2.5469	9.3633E-01
		1508	191	5	146	20	20	16	346	274	909	-473	-0.01	21	-2	20	13	1	2.900E-01	3.2825	6.2968E-01
		1497	187	6	120	14	14	37	401	93	1000	-773	-0.11	14	10	-50	13	0	1.000E+00	4.0353	2.3415E-01
		1495	184	6	54	380	100	54	380	100	867	-565	0.01	59	-3	-64	13	0	1.000E+00	3.4780	5.1975E-01
		1566	192	6	153	15	15	68	458	491	875	-722	0.01	59	-3	9	13	0	1.000E+00	3.5148	4.9877E-01
		1519	192	4	79	14	11	57	370	253	867	-500	0.10	29	5	5	13	0	1.000E+00	3.1808	6.8430E-01
		1556	193	5	77	16	13	73	368	460	777	-600	-0.03	18	3	41	13	0	1.000E+00	2.5207	9.1323E-01
Richard II	1595	1549	197	9	103	11	18	46	315	370	833	-542	-0.08	22	-8	33	13	0	1.000E+00	2.5110	9.4434E-01
		1511	196	8	40	11	22	51	270	574	867	-273	-0.05	24	-4	-103	13	1	2.900E-01	4.3216	1.3349E-01
		1497	189	8	120	7	21	48	222	342	1000	-576	-0.08	0	-4	-50	13	1	2.900E-01	3.1964	6.7610E-01
		1596	201	9	75	11	14	25	383	493	727	-741	-0.04	-24	1	-45	13	0	1.000E+00	3.7416	3.7387E-01
		1473	186	7	95	9	22	27	285	577	655	-448	-0.06	35	-1	-3	13	0	1.000E+00	2.3169	9.6617E-01
		1633	204	6	61	15	23	64	265	465	682	-128	-0.10	71	1	52	13	1	2.900E-01	3.6553	4.2031E-01
		1548	193	7	90	7	27	41	244	369	800	-757	0.06	29	2	17	13	0	1.000E+00	2.8020	8.5316E-01
		1531	190	6	78	8	26	53	326	558	1000	-486	0.04	-1	4	-58	13	0	1.000E+00	3.1256	7.1268E-01
		1583	196	7	63	9	27	46	316	471	867	-769	-0.06	32	3	15	13	0	1.000E+00	1.7551	9.9763E-01
		1466	181	7	82	10	29	39	320	461	800	-724	-0.02	52	5	10	13	0	1.000E+00	1.6853	9.9845E-01
		1493	184	6	54	8	23	60	315	266	500	-878	-0.05	60	2	18	13	0	1.000E+00	1.4996	9.9956E-01
		1596	194	4	125	6	18	67	366	410	823	-372	-0.07	29	7	14	13	0	1.000E+00	2.1905	9.7937E-01
		1367	166	4	88	6	13	66	331	373	467	-765	0.00	96	-1	44	13	0	1.000E+00	2.3124	9.6673E-01
		1368	165	6	58	9	26	67	376	263	833	-792	-0.06	60	0	47	13	0	1.000E+00	1.6793	9.9851E-01
		1596	1553	191	4	116	4	13	415	368	680	-510	-0.01	5	0	-3	13	0	1.000E+00	1.8232	9.9649E-01
			1474	178	5	122	8	15	55	441	294	-758	0.04	50	-10	19	13	1	2.900E-01	3.2392	6.5326E-01
			1555	190	5	167	5	22	38	102	188	-510	-0.07	-27	30	91	13	1	2.900E-01	5.7127	1.9326E-03
			1401	169	4	114	9	15	34	365	571	-689	0.05	71	11	149	13	1	2.900E-01	4.0553	2.5891E-01
			1493	181	6	107	8	17	472	98	583	-805	-0.03	40	12	-26	13	0	1.000E+00	3.2282	6.5918E-01
			1453	176	4	83	9	17	370	265	750	-750	0.03	69	-8	100	13	0	1.000E+00	4.3422	1.2768E-01
			1547	196	4	116	9	19	43	395	310	-727	-0.00	41	2	37	13	1	2.900E-01	7.9407	1.4840E-08
			1254	160	4	128	6	9	77	516	727	-600	0.01	41	2	36	13	0	1.000E+00	3.8799	3.0402E-01
			1590	188	4	63	14	13	56	441	714	-600	0.00	147	4	15	13	1	2.900E-01	4.2890	1.4307E-01
			1417	168	4	71	9	11	484	166	909	-682	0.13	110	0	28	13	0	1.000E+00	4.4569	9.8655E-02
1 Henry IV	1597	1326	162	6	60	17	19	19	321	765	321	-600	-0.10	59	-6	30	11	0	1.000E+00	2.1763	9.4328E-01
		1328	163	4	120	6	12	12	355	156	355	-1000	-0.04	45	-10	15	11	1	2.516E-01	2.9207	6.6514E-01
		1552	193	5	64	10	20	20	1552	733	1000	-733	-0.07	50	8	16	11	0	1.000E+00	2.6331	8.0447E-01
		1663	203	4	60	10	25	22	222	677	677	-758	0.09	50	0	21	11	0	1.000E+00	2.2523	9.2759E-01
		1543	202	13	143	11	33	33	406	867	867	-375	-0.13	-23	-21	4	11	1	2.516E-01	5.7240	5.7450E-04
		1465	186	8	150	13	31	27	465	475	1000	-652	-0.03	36	3	-2	11	0	1.000E+00	3.0241	6.0849E-01
		1633	201	6	86	14	31	37	366	778	778	-647	-0.08	50	-5	9	11	0	1.000E+00	1.0457	9.9992E-01
		1510	194	6	159	9	20	25	200	259	259	-533	-0.03	3	-27	-1	11	1	2.516E-01	3.1201	5.5437E-01
		1416	179	7	99	10	32	42	410	405	405	-675	-0.06	6	2	27	11	0	1.000E+00	1.3779	9.9882E-01
		1580	203	7	89	11	28	30	510	905	905	-667	-0.01	20	6	19	11	0	1.000E+00	2.1879	9.4105E-01
		1577	200	9	76	14	30	30	467	490	467	-744	-0.05	44	8	-22	11	0	1.000E+00	2.8838	6.8472E-01
		1591	194	5	25	9	26	167	167	1000	1000	-702	0.04	91	3	46	11	0	1.000E+00	3.1795	5.2059E-01



Shakespeare Play Verse Baseline Data, Blocksize = 1,500

Play and Block		Date Late	Words	Lines	Grade Level	HCV /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rate Words	T-E New Words	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Hamlet	1	1601	1552	196	7	52	17	31	34	310	569	333	-569	-0.17	13	-23	14	11	0	1.000E+00	3.4942	3.4811E-01
	2		1419	176	6	56	22	27	42	380	333	143	-772	-0.03	68	-3	150	11	1	2.516E-01	3.9658	1.7111E-01
	3		1576	195	6	63	18	26	35	42	538	684	-796	-0.16	4	-22	61	0	0	1.000E+00	3.4874	3.5159E-01
	4		1443	178	5	55	15	28	47	325	318	467	-941	-0.03	32	-22	61	11	1	2.516E-01	2.8793	6.8708E-01
	5		1445	175	7	14	17	27	71	318	601	538	-842	-0.03	78	-8	9	11	1	2.516E-01	3.5183	3.3888E-01
	6		1570	192	7	64	16	23	38	437	333	250	-731	-0.16	3	-4	19	11	0	1.000E+00	2.5790	8.2688E-01
	7		1500	185	7	93	17	38	47	354	469	111	-739	-0.13	13	-8	-10	11	0	1.000E+00	2.8344	7.1250E-01
	8		1516	188	6	26	10	27	58	440	370	267	-556	0.06	-7	-8	8	11	0	1.000E+00	2.0173	9.6784E-01
Troilus	1	1602	1510	191	7	40	16	33	34	310	318	667	-778	-0.15	-64	-24	-18	13	1	2.900E-01	4.4542	9.9275E-02
	2		1514	201	11	119	13	31	42	380	519	500	-451	-0.24	-90	-15	-10	13	3	4.133E-03	6.0734	4.3167E-04
	3		1534	191	9	26	15	35	42	528	436	430	-702	-0.06	4	-10	-10	13	0	1.000E+00	3.9480	2.7217E-01
	4		1481	190	9	122	20	42	47	325	700	700	-678	-0.06	-29	-19	14	13	0	1.000E+00	3.9626	2.6559E-01
	5		1509	185	5	93	20	30	47	431	455	455	-889	-0.06	-1	-9	18	11	0	1.000E+00	2.5842	8.2452E-01
	6		1506	186	8	53	16	28	71	318	489	579	-372	-0.11	18	-2	-21	11	0	1.000E+00	2.8094	7.2888E-01
	7		1427	176	4	56	16	20	38	437	404	333	-704	0.03	14	-7	18	13	0	1.000E+00	2.3828	9.5710E-01
	8		1518	186	5	40	13	19	37	354	296	586	-657	-0.06	31	-10	13	13	0	1.000E+00	1.8766	9.9530E-01
Measure	9	1603	1485	186	5	54	16	24	19	438	219	280	-824	-0.02	26	-7	31	13	0	1.000E+00	2.8678	8.2869E-01
	10		1534	189	4	78	12	18	37	354	154	545	-773	-0.08	39	-24	2	13	0	1.000E+00	2.9255	8.0541E-01
	11		2060	259	4	117	12	12	58	440	354	812	-724	-0.04	38	-29	1	13	2	4.360E-02	3.5526	4.7790E-01
	1		1480	184	8	14	17	41	41	377	625	377	-610	-0.05	24	1	4	11	1	2.516E-01	2.6610	7.9249E-01
	2		1497	180	4	67	22	24	24	455	241	455	-474	0.06	81	-5	-37	11	0	1.000E+00	3.3906	4.0268E-01
	3		1470	178	5	27	23	31	34	430	133	340	-583	0.06	52	6	34	11	0	1.000E+00	3.1553	5.3486E-01
	4		1422	171	7	56	20	31	47	325	385	385	-720	-0.04	70	-8	21	11	0	1.000E+00	2.2965	9.1718E-01
	5		1474	185	5	54	17	29	31	474	379	379	-758	-0.04	11	-9	51	11	0	1.000E+00	1.8861	9.8113E-01
Othello	6	1604	1529	191	5	26	16	31	35	437	272	714	-769	-0.04	63	-5	8	11	0	1.000E+00	2.5974	8.1923E-01
	7		1493	184	6	67	20	32	48	333	484	484	-672	0.02	79	-7	54	11	0	1.000E+00	2.3073	9.1449E-01
	8		1435	177	5	70	20	21	58	440	380	333	-609	-0.04	75	1	13	11	0	1.000E+00	2.2010	9.3847E-01
	1		1661	195	5	96	13	32	32	260	517	517	-460	0.06	34	-19	1	11	0	1.000E+00	2.0724	9.6049E-01
	2		1584	196	8	63	23	33	48	284	273	273	-700	0.00	31	-8	14	11	0	1.000E+00	2.6307	8.0946E-01
	3		1617	197	6	87	17	27	37	267	667	667	-762	-0.04	30	-5	23	11	0	1.000E+00	1.4271	9.0846E-01
	4		1398	195	5	50	17	24	47	205	205	200	-774	-0.03	22	-10	2	11	0	1.000E+00	2.5039	9.1534E-01
	5		1666	203	5	24	18	27	41	271	271	447	-714	0.05	47	1	43	11	1	2.516E-01	3.1780	5.2144E-01
Lear	6	1605	1613	188	5	50	16	26	35	437	221	304	-659	0.13	95	-6	14	11	0	1.000E+00	3.3316	4.3446E-01
	7		1645	199	5	49	14	27	0	341	119	0	-849	-0.07	61	-7	9	11	0	1.000E+00	3.0623	5.8707E-01
	8		1654	196	4	12	20	22	52	295	116	86	-778	0.01	60	-4	-53	11	1	2.516E-01	3.9792	1.4741E-01
	1		1478	178	8	68	19	33	47	296	242	500	-440	-0.10	22	1	-21	13	0	1.000E+00	2.6662	8.9647E-01
	2		1532	188	5	78	22	34	48	307	207	571	-500	-0.12	4	0	46	13	1	2.900E-01	3.0251	7.6143E-01
	3		1493	181	5	40	19	29	48	206	296	77	-440	-0.01	29	-8	54	13	1	2.900E-01	3.2570	6.4362E-01
	4		1516	188	5	119	15	37	37	299	333	333	-591	-0.01	-2	-8	13	11	0	1.000E+00	1.7252	9.9104E-01
	5		1479	177	5	243	18	37	48	206	305	263	-391	-0.01	40	-23	11	11	0	1.000E+00	4.7730	1.8972E-02
Macbeth	6	1606	1537	182	4	52	21	24	47	318	309	273	-647	-0.06	46	-7	16	11	0	1.000E+00	2.2218	9.3421E-01
	7		1523	180	4	92	21	26	35	380	385	385	-600	-0.02	39	-3	43	11	0	1.000E+00	1.9887	9.7122E-01
	8		1485	180	4	94	17	35	40	302	264	556	-568	-0.06	7	-15	21	11	0	1.000E+00	2.0060	9.6921E-01
	9		1507	177	4	106	15	34	40	341	203	529	-682	-0.04	20	-3	41	13	0	1.000E+00	1.8748	9.9534E-01
	10		1510	183	5	146	18	30	18	341	403	478	-404	0.07	70	-2	13	13	0	1.000E+00	3.2567	6.4378E-01
	11		1573	184	4	89	22	25	52	295	300	241	-600	0.03	56	14	17	13	1	2.900E-01	3.1556	6.9738E-01
	1		1524	192	6	52	17	36	36	641	692	692	-404	-0.15	-3	-8	10	11	0	1.000E+00	3.4517	3.7012E-01
	2		1499	181	6	93	26	42	42	739	649	739	-339	0.02	14	-20	11	11	0	1.000E+00	4.2019	8.8914E-02
	3		1528	185	4	92	20	29	49	407	407	273	-436	-0.10	23	-14	39	11	0	1.000E+00	2.5482	8.3851E-01
	4		1532	186	5	91	18	37	14	504	111	330	-320	-0.12	17	6	31	11	0	1.000E+00	3.2012	5.0826E-01
	5		1514	182	5	53	12	29	39	476	297	476	-364	-0.06	5	-9	13	11	0	1.000E+00	1.9688	9.7938E-01
	6		1477	177	4	108	13	39	39	422	422	400	-322	-0.03	15	-9	23	11	0	1.000E+00	2.1400	9.4981E-01
	7		1593	195	6	88	18	39	25	369	789	789	-793	-0.09	25	-1	24	11	0	1.000E+00	2.1669	9.4501E-01
	8		1310	161	4	153	22	34	52	328	328	238	-500	-0.07	2	-7	20	11	0	1.000E+00	2.9933	6.2560E-01

Others Play Verse versus Shakespeare Baseline, Blocksize = 1,500

Play and Block	Date Late	Words	Lines	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Endities /1000 lines	Precilities /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rate Words	T-E New Words	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (2.6%)	Continuous Composite Error	Continuous Composite Probability
Tanz2	1588	1722	236	11	12	5	19			390	600	-550	-0.21	-56	-50	-3	11	4	1.302E-04	7.3751	1.0010E-07
		1708	221	10	59	7	18	11	165	333	200	-483	-0.15	-6	-25	-26	11	2	3.181E-02	4.7639	1.9511E-02
		1687	235	12	12	7	27	27	175	572	692	-727	-0.17	-47	-59	-31	11	4	1.302E-04	8.1842	4.5608E-10
		1710	230	11	23	10	20	20	6	371	636	-818	-0.14	-47	-36	-47	11	4	1.302E-04	6.1423	8.6955E-05
		1668	215	8	36	9	15	215	136	451	733	-682	-0.23	-63	-42	-42	11	3	2.479E-03	6.2636	4.8361E-05
		1765	233	9	23	5	25			520	100	-628	-0.10	-17	-26	-8	11	3	2.479E-03	4.8583	1.4514E-02
Janu4	1591	1498	180	7	13	1	18	22	167	232	524	-764	-0.03	83	-2	47	13	3	4.133E-03	5.0249	2.1400E-02
		1453	176	7	28	5	18	11	105	316	684	-707	-0.03	72	-17	-34	13	2	4.360E-02	4.8125	3.9794E-02
		1506	183	5	13	8	26	27	175	208	857	-600	-0.06	33	-9	10	13	2	4.360E-02	3.9231	2.8306E-01
		1486	182	5	13	8	26	27	175	208	857	-600	-0.06	33	-9	10	13	2	4.360E-02	4.8125	3.9794E-02
		1489	184	5	0	2	17	5	136	341	636	-500	-0.02	40	-15	17	13	4	2.706E-04	5.2650	9.9652E-03
		1457	177	4	0	4	11	0	107	289	778	-512	0.04	40	-5	32	13	3	4.133E-03	5.7355	1.7663E-03
Maja Cleo	1593	1528	195	9	13	7	15	15	103	364	500	-824	-0.03		-15		11	3	2.479E-03	5.5393	3.7494E-03
		1562	190	10	13	3	36	26	268	456	714	-359	-0.21	-99	-37	14	13	5	1.284E-05	7.4269	3.7896E-07
		1343	173	11	60	5	36			126	600	-283	-0.19	-21	-27	3	11	3	2.479E-03	5.8824	2.8809E-04
		1446	182	12	11	14	26			203	250	-593	-0.07	33	-30	-3	11	2	3.181E-02	5.0909	6.6764E-03
		1445	184	9	28	21	14			118	250	-571	-0.09	78	-48	-133	11	2	3.181E-02	6.7646	3.5651E-06
		1452	185	8	0	0	12	21		207	571	-429	-0.09	40	-35	-128	11	3	2.479E-03	5.4704	1.6280E-03
Diet	1594	1385	174	12	14	11	23			315	91	-231	-0.11	-1	-14	-64	11	3	2.479E-03	5.7356	5.4674E-04
		1561	204	15	154	9	19	25	270	616	750	-490	-0.21	-69	-37	-129	13	5	1.284E-05	9.7809	1.0790E-14
		1304	171	10	121	9	13	13	185	529	800	-480	-0.19	-21	-27	78	11	3	2.479E-03	5.7408	5.3471E-04
		1408	184	9	43	11	17	27	120	463	714	-667	-0.07	33	-30	-45	13	2	4.360E-02	5.4681	4.8632E-03
		1423	181	11	98	8	17			770	1000	-903	-0.09	78	-48	-44	11	4	1.302E-04	7.3910	9.0687E-08
		1445	191	9	28	10	15			767	1000	-951	-0.09	40	-35	-18	11	3	2.479E-03	6.1869	7.0225E-05
JKC	1594	1559	193	16	38	11	15			561	1000	-807	-0.11	-1	-14	-138	11	2	3.181E-02	8.2982	2.0109E-10
		1506	190	6	27	11	11	4	11	463	857	-758	-0.03	30	-17	70	13	2	4.360E-02	4.5196	8.5068E-02
		1540	184	5	26	16	13	16	185	336	889	-742	0.03	39	-8	-69	13	2	4.360E-02	4.4367	1.0337E-01
		1356	164	5	0	0	18	9		361	680	-742	0.07	82	-8	73	11	1	2.510E-01	3.8524	1.8989E-01
		1371	168	6	0	22	8			295	750	-689	-0.08	43	-1	37	11	1	2.510E-01	3.2794	4.6406E-01
		1376	166	6	0	17	7			189	619	-697	0.06	88	-10	27	11	2	3.181E-02	3.8238	2.0049E-01
Sija	1603	1370	166	7	0	16				344	294	-647	0.12	63	0	11	11	2	3.181E-02	3.8787	1.8048E-01
		1535	192	7	26	11	29			664	435	-350	-0.07	-9	-27	51	11	1	2.510E-01	4.3846	5.7177E-02
		1641	204	5	37	13	32	10	211	680	429	-306	-0.09	35	-34	42	13	3	4.133E-03	4.6531	5.9440E-02
		1512	195	6	26	13	33	10	215	537	765	-576	-0.04	18	-2	16	13	2	4.360E-02	3.8922	2.9813E-01
		1594	201	6	50	11	38	10	244	464	846	-568	0.01	16	-17	10	13	1	2.900E-01	3.8067	3.4020E-01
		1595	204	8	13	10	38			459	700	-212	-0.06	-21	-26	-32	11	2	3.181E-02	4.6724	2.5713E-02
Wprz	1604	1594	206	6	63	10	28	10	223	504	546	-628	-0.11	-1	-20	23	13	2	4.360E-02	3.8334	3.2678E-01
		1491	168	4	27	33	20	155	250	111	500	-933	0.03	84	-7	13	13	3	4.133E-03	7.0693	3.0111E-06
		1562	185	6	38	33	27			170	143	-733	-0.04	53	-5	27	11	2	3.181E-02	4.4761	4.4857E-02
		1486	170	4	108	28	22			106	-272	-938	0.01	86	-23	10	11	2	3.181E-02	5.4034	2.1157E-03
		1490	172	7	54	38	21	99	343	97	0	-773	-0.06	42	6	21	13	1	2.900E-01	5.7350	1.7839E-03
		1476	175	7	24	30	22			-176	-283	-383	-0.07	47	-25	6	11	3	2.479E-03	4.6734	2.0109E-10
		1533	177	5	26	31	25			-38	-273	-771	-0.10	24	-27	21	11	4	1.302E-04	5.6944	6.5139E-04

Discrimination Statistics  
Rejections  
Percentage  
Blocks Tested

Rejections	38	42
Percentage	88%	98%
Blocks Tested	43	43

Aggregates

Aggregates	38	42
Rejections	38	42
Percentage	88%	98%
Blocks Tested	43	43

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Endities /1000 lines	Precilities /1000 lines	BoB5	BoB7	BoB8	T-E Slope Test	T-E Rate Words	T-E New Words	Buckets Block
4	24	3	8	18	235	93	0	-889	-0.22	-40	-24	-77
9	243	29	55	123	561	761	1000	-209	0.15	116	12	100
Global Min		3	8	18	235	93	0	-889	-0.22	-40	-24	-77
Global Max		3	8	18	235	93	0	-889	-0.22	-40	-24	-77
Min to 1600		3	8	18	235	93	0	-889	-0.22	-40	-24	-77
Max to 1600		29	55	123	561	761	1000	-209	0.15	116	12	100
Min from 1600		3	13	13	13	13	0	-283	-0.10	24	-27	21
Max from 1600		29	55	123	561	761	1000	-209	0.15	116	12	100

Composite Thresholds

Discrete	Continuous
2.510E-01	3.481E-01
Minimum	0
Maximum	1

Sh Discrete Rejection Profile (See note in text)  
Minimum  
Maximum



# APPENDIX SEVEN, POEMS: KEY TO TABLES FOR 1,500-WORD POEM TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	10 to 16
HC/20K: E	Hyphenated compound words per 20,000 words.	24 to 243
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	3 to 29
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 7 to 24 Late, fr. 1600: 13 to 23
Enclitics: P	Enclitic microphrases per 1000 lines.	18 to 123
Proclitics: P	Proclitic microphrases per 1000 lines.	235 to 561
Bob5	Bundles of badges 5. See text for components.	93 to 761
BoB7	Bundle of badges 7. See text for components.	0 to 1000
BoB8	Bundle of badges 8. See text for components	-889 to -209
T-E Slope Test	Thisted-Efron Slope Test.	-0.22 to 0.15
T-E New Word Test	Thisted-Efron New Word Test.	-24 to 12
Modal Block: G	Modal Score per Block.	79 to 407
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Composite Probability	See Table 2. Probability that observed rejections would occur by chance at Sh.'s avg. rejection rate.	2.710E-01
Continuous Composite Probability	See Table 2. Prob. that observed comp. probability score would occur by chance, Sh.'s lowest block.	1.2386E-01
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 1500-WORD POEM BLOCKS

Only 7 of 27 Shakespeare baseline poem blocks (26%) have even one individual rejection in 12 tests. None of 27 blocks of poems by others have fewer than two individual rejections in 12 tests. Both discrete and continuous composite scoring pass 100% of Shakespeare's blocks and reject 96-100% of others' blocks. Perhaps a quarter could be considered close calls, but most, including Oxford, Bacon and Marlowe, could not. *Test Sensitivities:* G = genre; T = time of composition; E = editing; P = prosody.

Shakespeare Poems Baseline Data, Blocksize = 750

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics no/(no+not) /1000 lines	BoB5	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability
Venus	1	231	8	11	31	188	0	74	714	-333	51	11	1	4.1738	9.6035E-02
	2	160	11	4	11	211	200	570	1000	-636	20	11	1	4.0527	1.2609E-01
	3	8	12	6	21	292	375	29	600	-684	108	11	1	3.2667	4.7119E-01
	4	12	18	8	104	375	200	297	1000	-667	58	11	0	3.1013	5.6503E-01
	5	10	19	5	10	260	333	382	571	-429	68	11	1	3.1273	5.9028E-01
	6	10	20	9	33	444	429	225	600	-692	84	11	0	3.1906	5.1428E-01
	7	126	23	5	42	354	263	263	600	-524	50	11	1	3.4927	3.4888E-01
	8	12	17	16	63	229	400	456	500	-572	71	11	0	2.7619	7.4618E-01
	9	11	142	10	11	287	364	348	625	-366	52	11	0	1.6739	9.9309E-01
	10	13	138	21	8	315	600	-19	714	-304	75	11	1	3.3295	4.3612E-01
	11	43	13	13	61	272	471	171	538	-385	260	11	1	3.8829	1.7900E-01
	12	111	4	13	19	278	200	477	333	-636	43	11	0	3.2349	4.8914E-01
Lucrece	1	83	11	24	31	265	500	612	1000	-421	12	11	0	3.3455	4.2729E-01
	2	15	184	12	20	31	286	889	778	-630	166	11	1	4.2575	7.8696E-02
	3	8	128	12	11	61	296	273	1000	-286	51	11	0	2.6948	7.7749E-01
	4	11	136	6	13	297	500	750	1000	-286	115	11	0	3.3219	4.4033E-01
	5	11	160	17	13	41	245	500	500	-333	74	11	0	2.4860	8.6107E-01
	6	13	158	22	13	31	255	500	1000	-619	75	11	0	2.7892	7.3290E-01
	7	11	115	18	13	77	242	500	333	-273	95	11	0	3.0380	6.0072E-01
	8	14	188	10	15	20	333	167	1000	-750	146	11	0	2.7270	7.6271E-01
	9	11	268	13	12	10	204	333	1000	-474	73	11	0	3.9605	1.5321E-01
	10	11	134	12	7	41	265	667	556	-846	99	11	0	3.6992	2.5097E-01
	11	15	129	13	13	10	316	364	1000	-583	73	11	0	2.3065	9.1469E-01
	12	10	82	15	11	66	429	273	455	-333	189	11	0	3.3155	4.4389E-01
	13	9	152	20	12	41	378	375	667	-520	113	11	0	2.5890	8.2261E-01
	14	16	100	16	25	10	276	375	778	-680	131	11	0	3.3260	4.3806E-01
	15	16	131	11	16	82	327	0	600	-250	186	11	1	3.7164	2.4359E-01
	16	15	153	11	17	82	418	429	1000	-846	165	11	0	3.4801	3.5535E-01
	17	11	89	14	19	48	500	0	1000	-714	52	11	1	3.1653	5.2867E-01
	18	15	71	11	30	71	329	400	600	-895	143	11	0	3.9874	1.4491E-01
	19	11	200	4	21	52	556	77	500	-655	119	11	0	3.1570	5.3339E-01
	20	9	99	1	16	299	500	505	200	-333	-19	11	2	4.2545	7.9272E-02
Sonnets	1	13	241	6	18	153	125	579	600	-467	83	11	0	4.6212	2.9870E-02
	2	11	50	13	18	31	286	364	1000	-263	85	11	0	2.3628	8.9970E-01
	3	17	99	16	18	82	439	100	1000	-565	137	11	1	3.6035	2.9429E-01
	4	15	0	8	21	345	111	363	750	0	129	11	2	4.1580	9.9614E-02
	5	20	149	10	18	92	250	225	500	-427	117	11	1	3.7609	2.2511E-01
	6	10	0	5	15	337	250	25	1000	-471	42	11	2	3.4139	3.9015E-01
	7	13	24	10	15	71	398	59	800	-750	95	11	0	2.7867	7.3413E-01
	8	12	102	5	13	41	286	697	1000	-655	75	11	0	2.8885	6.8225E-01
	9	11	152	7	19	31	306	636	833	-478	60	11	0	2.5709	8.2977E-01
	10	15	52	2	14	31	306	667	1000	-700	110	11	1	3.2675	4.7074E-01
	11	14	73	4	19	82	306	545	1000	-526	86	11	0	2.4906	8.5948E-01
	12	13	101	1	17	10	265	419	1000	-294	223	11	2	3.8181	2.0265E-01
	13	11	151	21	13	41	306	286	636	-467	107	11	0	2.1100	9.5478E-01
	14	10	50	5	13	71	265	300	1000	-692	93	11	0	2.5038	8.5483E-01
	15	14	24	4	18	51	327	429	1000	-412	-11	11	0	3.1660	5.2827E-01
	16	14	0	5	17	20	367	193	500	-482	47	11	1	3.0150	6.1356E-01

Shakespeare Poems Baseline Data, Blocksize = 750

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	no /(no+not)	BoB5	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability
17	14	101	14	23	41	439	357	486	500	-408	111	11	0	1.000E+00	2.9042	6.7395E-01
18	11	26	20	23	20	306	375	234	667	-333	77	11	0	1.000E+00	3.0107	6.1596E-01
19	14	0	4	22	104	302	375	137	1000	-600	57	11	1	3.618E-01	3.5011	3.4459E-01
20	10	95	4	8	143	316	167	217	1000	-926	91	11	1	3.618E-01	4.3562	6.1517E-02
21	14	100	7	12	61	510	231	179	636	-310	104	11	0	1.000E+00	3.4151	3.8951E-01
22	10	122	6	19	112	449	333	107	1000	-438	70	11	0	1.000E+00	3.4106	3.9192E-01

Discrete Discrimination Statistics

Rejections Percentage	2	4	3	4	0	0	3	4	0	1	3	24
	4%	7%	6%	7%	0%	0%	6%	7%	0%	2%	6%	4%
												594

Aggregates

Poems Baseline: Standard Statistical Profile

Blocks Tested	54	54	54	54	54	54	54	54	54	54	54	54
Mean	12.24	112.93	11.15	14.87	52.65	320.05	365.37	325.31	753.41	-511.46	92.32	92.32
Std Dev	2.50	61.60	5.92	5.42	33.28	68.82	166.57	196.18	230.45	189.20	51.92	51.92
Minimum	8.00	0.00	1.00	4.00	10.20	187.50	0.00	-19.00	200.00	-926.00	-18.63	-18.63
Maximum	20.00	267.74	23.00	30.00	153.06	510.20	889.00	750.00	1000.00	0.00	260.11	260.11

Composite Discrimination Statistics

Composite Thresholds	3.618E-01	6.1517E-02
Sh Discrete Rejection Profile (See note in key)	Minimum	0
	Maximum	1

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	8	16	24	268	3	51	6	10	157	510	667	100	59	-146	-929	-11
Global Min																
Global Max																
Min to 1600																
Max to 1600																
Min from 1600																
Max from 1600																

Other Poets versus Shakespeare Baseline, Blocksize = 750

Poem and Block	Grade Level	HWC /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics no /1000 lines	BoB5 no / (no+not)	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability
Bac75-1	11	0	3	4	22	330	250	1000	-333	697	11	3	8.291E-03	12.2410	<1.000E-15
Bac75-2	14	0	8	9	0	140	400	695	-530	517	11	4	6.734E-04	9.2909	8.8176E-14
Gre75-1	12	107	6	9	0	118	444	435	-412	105	11	2	6.923E-02	3.8809	1.7970E-01
Gre75-2	8	79	3	18	0	117	769	193	-692	126	11	3	8.291E-03	5.3897	2.2307E-03
Dde75-1	11	125	20	20	10	121	615	-91	0	74	11	3	8.291E-03	5.3653	2.4497E-03
Dde75-2	13	58	7	32	24	94	429	100	-800	238	11	2	6.923E-02	5.8918	2.7627E-04
Barnes75-1	7	26	23	11	13	187	333	511	-154	227	11	3	8.291E-03	6.1626	7.8919E-05
Barnes75-2	5	86	18	25	11	227	400	115	-111	142	11	3	8.291E-03	5.8342	3.5657E-04
Mhe75-1	9	26	6	20	83	240	250	191	0	189	11	0	1.000E+00	3.8703	1.8343E-01
Mhe75-2	9	50	12	24	38	368	333	422	-222	124	11	0	1.000E+00	3.2284	4.9282E-01
Ox75-1	9	51	0	8	22	108	400	386	-304	356	11	3	8.291E-03	6.8189	2.6403E-06
Ox75-2	7	7	0	7	7	117	750	-12	600	575	11	1000	1.340E-11	12.4544	<1.000E-15
Idea75-1	6	76	12	9	10	242	842	215	-131	215	11	4	6.734E-04	5.4706	1.6267E-03
Idea75-2	8	87	7	8	71	153	0	369	-467	104	11	1	3.618E-01	4.0468	1.2772E-01
Nash75-1	6	97	3	12	49	272	333	273	-667	161	11	1	3.618E-01	3.5589	3.1573E-01
Nash75-2	7	65	7	16	26	410	636	400	-714	264	11	2	6.923E-02	4.7768	1.8750E-02
Spam75-1	11	151	7	16	10	356	200	387	-154	51	11	1	3.618E-01	3.0871	5.7307E-01
Spam75-2	12	58	13	11	11	356	333	206	-217	161	11	0	1.000E+00	2.9964	6.2389E-01
Fid75-1	7	101	18	6	30	303	1000	323	-667	116	11	2	6.923E-02	5.0505	7.6776E-03
Fid75-2	4	24	15	10	20	253	429	261	-482	492	11	2	6.923E-02	8.7616	6.2070E-12
Che75-1	19	127	10	25	48	476	333	538	-548	150	11	1	3.618E-01	4.4349	5.0102E-02
Che75-2	21	0	14	31	43	298	0	158	77	63	11	4	6.734E-04	6.4492	1.9052E-05
Midg75-1	14	506	6	12	0	232	333	400	-667	190	11	3	8.291E-03	7.1573	3.7621E-07
Midg75-2	9	317	19	4	20	121	800	326	-571	99	11	5	3.862E-05	7.5455	3.4209E-08
Fiam75-1	19	163	18	14	9	264	500	517	-200	90	11	2	6.923E-02	4.1387	1.0412E-01
Fiam75-2	21	223	31	20	20	131	0	767	-200	28	11	5	3.862E-05	7.1630	3.6365E-07
Don75-1	10	362	3	26	50	366	375	314	238	100	11	2	6.923E-02	6.3181	3.6943E-05
Don75-2	13	51	13	20	39	223	333	323	-222	127	11	0	1.000E+00	2.6818	7.8332E-01

Discrete Discrimination Statistics

Rejections	12	7	3	2	7	9	8	3	6	10	70
Percentage	43%	25%	11%	7%	25%	32%	29%	11%	21%	36%	23%
Blocks Tested	28	28	28	28	28	28	28	28	28	28	308

Composite Discrimination Statistics

	20	71%	28
	19	68%	28

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HWC /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics no /1000 lines	BoB5	BoB7	BoB8	Modal Block
Global Min	8	24	3	6	10	152	-146	-929	-11
Global Max	16	268	28	51	157	510	1000	-143	189
Min to 1600				6		667	200	-929	
Max to 1600				32		1000	1000	-143	
Min from 1600				12		146	146	-929	
Max from 1600				51		1000	1000	-143	

Composite Thresholds

Discrete	Continuous
3.618E-01	6.1517E-02

Sh Discrete Rejection Profile (See note in key)

Minimum	0
Maximum	1

# APPENDIX EIGHT, POEMS: KEY TO TABLES FOR 750-WORD POEM TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date late	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	8 to 16
HC/20K: E	Hyphenated compound words per 20,000 words.	24 to 268
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	3 to 28
Open Lines: T, E, P	Percentage of open or run-on verse lines.	Early, to 1600: 6 to 32 Late, fr. 1600: 12 to 51
Enclitics: P	Enclitic microphrases per 1000 lines.	10 to 137
Proclitics: P	Proclitic microphrases per 1000 lines.	152 to 510
No/no+not	Ratio of the number of occurrences of <i>no</i> to that of <i>no</i> plus <i>not</i> combined, times 1000.	100 to 667
Bob5	Bundles of badges 5. See text for components.	59 to 750
BoB7	Bundle of badges 7. See text for components.	-146 to 1000
BoB8	Bundle of badges 8. See text for components.	-929 to -142
Modal Block: G	Modal Score per Block.	-11 to 189
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Composite Probability	See Table 2. Probability that observed rejections would occur by chance at Sh.'s avg. rejection rate.	3.618E-01
Continuous Composite Probability	See Table 2. Probability that observed composite probability score would occur by chance, here measured for Sh.'s lowest-probability block.	6.1517E-02
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 750-WORD POEM BLOCKS

Of 54 Shakespeare blocks tested, 4 (7%) have more than one rejection in 11 tests. Of 28 non-Shakespeare blocks tested, 20 (71%) have more than one rejection. For blocks this small, accuracy is significantly lower than for larger blocks, but much better than chance: 7% false negatives, 29% false positives, many close calls, 85% of 82 blocks correctly assigned. Some rejection calls, notably Bacon and Oxford, are still not close even at 750 words. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.



Shakespeare Play Verse Baseline Data, Blocksize = 750

Play and Block	Date Late	Words	Lines	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability
Richard III	1593	749	97	9	160	13	30	21	278	423	500	-943	29	10	1	3.352E-01	3.0346	5.124E-01
		746	94	7	107	18	19	0	383	429	500	-714	13	10	1	3.352E-01	2.4700	8.0672E-01
		749	94	5	27	12	10	64	266	441	714	-643	13	10	0	1.000E+00	2.0211	9.4344E-01
		748	93	6	134	12	10	32	312	132	600	-769	34	10	0	1.000E+00	2.3612	8.4960E-01
		742	95	6	27	14	19	42	253	250	556	-523	9	10	0	1.000E+00	1.5180	9.9343E-01
		768	97	5	78	10	19	31	340	237	429	-517	32	10	0	1.000E+00	1.4010	9.9662E-01
		761	93	5	131	18	16	43	355	327	667	-1000	-57	10	1	3.352E-01	2.9187	5.7830E-01
		747	91	5	107	22	12	44	286	230	556	-874	18	10	0	1.000E+00	2.5111	7.8897E-01
		747	96	6	54	11	26	31	177	400	500	-667	19	10	0	1.000E+00	2.1561	9.1337E-01
		750	92	5	27	15	22	43	489	712	600	-630	18	10	0	1.000E+00	3.3972	3.1695E-01
		751	94	6	80	13	20	43	362	224	857	-697	13	10	0	1.000E+00	1.3621	9.9733E-01
		755	90	5	0	9	20	56	311	581	800	-83	79	10	1	3.352E-01	3.6641	2.0084E-01
		734	92	5	191	18	13	54	348	241	714	-714	-4	10	0	1.000E+00	2.6717	7.1236E-01
		762	91	5	26	18	16	77	484	576	692	-286	44	10	0	1.000E+00	3.1760	4.5290E-01
		753	93	4	27	9	24	22	353	351	1000	-167	69	10	0	1.000E+00	3.1547	4.4470E-01
Richard II	1595	768	94	4	78	19	7	0	340	406	800	-600	81	10	1	3.352E-01	3.4010	3.1509E-01
		755	96	11	79	16	18	52	323	381	333	-400	25	10	1	3.352E-01	2.7681	6.6178E-01
		794	102	8	151	7	18	39	304	359	1000	-624	55	10	0	1.000E+00	2.6977	6.9900E-01
		740	95	6	27	8	21	63	305	611	1000	-369	-30	10	0	1.000E+00	2.9250	5.7473E-01
		772	101	9	26	13	24	40	238	541	714	-143	-128	10	1	3.352E-01	4.5582	2.2702E-02
		745	97	11	134	4	23	52	289	407	1000	-419	-7	10	1	3.352E-01	3.6919	1.9054E-01
		752	92	6	106	10	26	43	152	285	1000	-750	-7	10	0	1.000E+00	2.7239	6.8532E-01
		782	98	9	51	17	18	0	469	642	400	-572	-43	10	1	3.352E-01	3.9281	1.1715E-01
		814	103	9	98	6	11	49	301	321	1000	-800	-16	10	0	1.000E+00	2.8683	6.0666E-01
		760	95	5	132	6	21	11	284	627	647	-429	-37	10	1	3.352E-01	3.1770	4.3234E-01
		714	92	11	56	12	23	43	283	514	667	-467	32	10	1	3.352E-01	2.9446	5.6362E-01
		759	95	6	53	15	20	74	242	443	583	-91	17	10	0	1.000E+00	2.6823	7.0694E-01
		875	109	6	69	15	25	55	284	484	800	-177	66	10	0	1.000E+00	2.5645	7.6471E-01
		786	95	7	102	10	21	42	189	349	667	-692	12	10	0	1.000E+00	2.0583	9.4010E-01
		762	98	9	79	3	20	41	296	402	1000	-800	-22	10	0	1.000E+00	2.9555	5.5743E-01
Romeo	1596	795	98	6	126	7	22	51	347	580	1000	-286	-107	10	1	3.352E-01	3.9190	1.1953E-01
		737	92	8	0	10	30	54	304	538	1000	-619	16	10	1	3.352E-01	2.6913	7.0231E-01
		797	101	8	75	9	32	30	218	603	1000	-868	25	10	0	1.000E+00	3.2270	4.0499E-01
		788	96	6	25	8	21	63	417	306	714	-636	-3	10	1	1.000E+00	2.0193	9.4378E-01
		756	91	7	106	10	30	22	418	471	818	-706	8	10	0	1.000E+00	2.2538	8.8580E-01
		710	90	7	56	10	27	56	222	450	778	-810	4	10	1	3.352E-01	2.0524	9.3726E-01
		713	87	6	0	10	17	92	345	355	1000	-929	55	10	0	1.000E+00	2.6972	6.9926E-01
		780	99	6	103	6	27	30	283	185	250	-385	-38	10	1	3.352E-01	3.2779	3.7776E-01
		786	97	7	153	1	23	62	330	483	1000	-364	24	10	0	1.000E+00	2.1562	9.1335E-01
		810	97	6	99	10	13	72	402	355	750	-750	24	10	1	3.352E-01	5.3912	1.2163E-03
		673	83	15	30	11	17	72	169	496	556	-765	59	10	1	3.352E-01	3.6396	2.1020E-01
		694	84	4	115	1	8	60	488	236	333	-765	11	10	1	3.352E-01	2.2177	8.9658E-01
		677	82	8	89	5	30	49	378	857	857	-680	23	10	0	1.000E+00	2.6942	7.0082E-01
		691	83	5	29	13	21	84	373	301	800	-913	44	10	0	1.000E+00		
		768	98	6	156	1	13	10	265	571	1000	-200	27	10	1	3.352E-01	4.0098	9.7407E-02
		786	95	3	102	6	12	32	368	186	619	-724	-48	10	0	1.000E+00	2.9524	5.5919E-01
		716	88	5	168	8	18	68	364	-69	200	-530	-69	10	0	1.000E+00	3.8478	1.3931E-01
		758	91	5	158	8	12	22	352	88	429	-1000	15	10	1	3.352E-01	3.3105	3.6069E-01
		770	96	7	208	3	23	10	385	141	636	-273	0	10	0	1.000E+00	3.7486	1.7063E-01
		785	96	3	127	7	21	42	385	68	-48	-704	63	10	1	3.352E-01	3.3855	3.2270E-01
		703	87	3	114	10	11	34	460	275	652	-882	16	10	0	1.000E+00	3.0697	4.9248E-01
		698	84	5	115	8	18	48	214	474	-572	-47	10	1	1	3.352E-01	2.8413	6.2171E-01
		749	91	5	134	8	9	22	407	9	750	-619	-19	10	1	3.352E-01	3.2365	3.9986E-01
		744	93	5	134	8	20	86	495	217	500	-1000	-158	10	2	5.815E-02	5.4212	1.0774E-03

Shakespeare Play Verse Baseline Data, Blocksize = 750

Play and Block	Date Late	Words	Lines	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Poetries /1000 lines	BoB5	BoB7	BoB8	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (40%)	Continuous Composite Error	Continuous Composite Probability
Troilus	1	701	89	7	29	17	21	68	307	439	778	-778	2	8	0	1.000E+00	1.8625	9.0159E-01
	2	726	88	3	55	16	18	37	307	394	231	-750	-7	10	0	1.000E+00	2.2792	8.7779E-01
	3	749	93	5	27	14	25	22	376	182	1000	-667	8	10	0	1.000E+00	2.2398	8.9006E-01
	4	769	94	4	26	13	14	43	362	389	400	-647	33	10	0	1.000E+00	1.9854	9.4993E-01
	5	731	92	5	27	16	29	22	424	313	500	-790	42	10	0	1.000E+00	2.3680	8.4710E-01
	6	734	95	5	80	15	18	11	337	120	77	-867	10	10	0	1.000E+00	2.6949	7.0045E-01
	7	763	93	5	0	15	17	32	505	206	333	-539	9	10	1	3.352E-01	3.0338	5.1286E-01
	8	771	97	4	156	9	20	41	206	92	692	-871	1	10	1	3.352E-01	3.0915	4.8015E-01
	9	974	126	5	82	13	373	48	373	405	600	-636	11	10	0	1.000E+00	1.2360	9.9885E-01
	10	1087	134	4	129	12	7	52	388	306	1000	-778	26	10	1	3.352E-01	2.7312	6.8147E-01
Lear	1	728	89	7	55	19	34	45	281	240	-1000	-546	29	10	1	3.352E-01	4.3241	4.4273E-02
	2	750	88	8	53	19	34	45	284	244	636	-357	-40	10	0	1.000E+00	2.5176	7.8608E-01
	3	761	93	5	104	23	34	21	269	304	600	-613	-6	10	0	3.352E-01	3.5878	5.7608E-01
	4	771	93	6	104	23	33	11	269	104	600	-607	11	10	0	1.000E+00	2.5848	7.5530E-01
	5	736	88	4	100	19	30	57	159	270	143	-564	88	10	2	5.815E-02	3.6562	2.0383E-01
	6	757	92	6	79	19	38	33	217	324	0	-334	18	10	0	1.000E+00	2.6369	7.2985E-01
Antony	1	782	97	4	51	15	35	31	371	467	429	-304	1	10	0	1.000E+00	2.3406	8.5702E-01
	2	790	86	4	27	22	33	81	395	471	167	-167	-28	10	0	1.000E+00	3.4778	2.7874E-01
	3	703	87	8	0	17	48	46	310	522	250	-474	18	10	1	3.352E-01	3.1157	4.6651E-01
	4	751	91	5	107	21	42	77	308	433	0	-308	50	10	0	1.000E+00	3.1579	4.4932E-01
	5	747	94	6	27	18	41	64	277	259	-77	-625	7	10	0	1.000E+00	2.6240	7.3622E-01
	6	760	91	8	0	26	50	22	264	352	250	-226	-14	10	1	3.352E-01	3.8718	1.3240E-01
	7	733	93	6	136	26	40	32	172	219	1000	-53	13	10	1	3.352E-01	4.1250	7.4019E-02
	8	686	80	4	87	21	30	38	250	333	333	-600	3	10	0	1.000E+00	1.9581	9.5452E-01
	9	770	93	4	78	13	38	43	247	281	400	-473	12	10	0	1.000E+00	1.8325	9.7170E-01
	10	722	84	3	28	12	25	71	286	71	-146	-467	30	10	0	1.000E+00	3.1737	4.3417E-01
Tempest	1	749	89	5	0	24	49	157	360	186	0	-286	46	10	1	3.352E-01	5.7296	2.9108E-04
	2	751	95	10	80	28	57	42	305	189	0	-357	-16	10	1	3.352E-01	4.5268	2.4929E-02
	3	723	86	5	138	12	35	105	407	128	333	-177	12	10	0	1.000E+00	3.7182	1.8112E-01
	4	762	92	5	236	13	51	54	359	-20	-667	-313	-13	10	2	5.815E-02	5.4018	1.1654E-03
	5	736	85	3	54	28	40	118	341	63	0	-600	37	10	0	1.000E+00	4.6653	1.6347E-02
	6	765	92	5	52	17	40	54	293	223	1000	-250	19	10	0	1.000E+00	2.5000	7.9384E-01
	7	750	91	5	53	20	51	55	297	250	500	-600	-7	10	0	1.000E+00	2.6511	7.2277E-01
	8	761	87	5	105	21	39	92	483	121	0	-500	5	10	0	1.000E+00	3.6982	1.8826E-01
	9	759	90	5	79	26	49	33	256	153	-111	-625	-6	10	0	1.000E+00	3.6685	1.9918E-01
	10	747	90	6	187	18	53	56	356	345	455	-280	19	10	1	3.352E-01	3.4593	2.8729E-01

Discrete Discrimination Statistics

Rejections	4	10	4	3	0	4	3	5	4	40
Percentage	4%	11%	4%	3%	3%	4%	3%	6%	4%	89%

Aggregates

Rejections	3	10	3	5	4	40
Percentage	3%	11%	3%	6%	4%	89%

Poems Baseline: Standard Statistical Profile

Blocks Tested	Mean	Std Dev	Minimum	Maximum
90	5.96	80.73	13.51	25.26
506	5.96	80.73	13.51	25.26
205	5.96	80.73	13.51	25.26
3000	5.96	80.73	13.51	25.26
15000	5.96	80.73	13.51	25.26

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Poetries /1000 lines	BoB5	BoB7	BoB8	Buckets Block
3	26	28	3	6	10	63	-146	-929	-69
10	236	28	51	157	505	712	1000	-83	81
Global Min	3	28	3	6	10	63	-146	-929	-69
Global Max	10	236	51	157	505	712	1000	-83	81
Min to 1600	3	28	3	6	10	63	-146	-929	-69
Max to 1600	10	236	51	157	505	712	1000	-83	81
Min from 1600	3	28	3	6	10	63	-146	-929	-69
Max from 1600	10	236	51	157	505	712	1000	-83	81

Composite Discrimination Statistics

Rejections	3	10	3	5	4	40
Percentage	3%	11%	3%	6%	4%	89%

Composite Thresholds

3.352E-01	1.1715E-01
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Sh Discrete Rejection Profile (See note in key)

Minimum	0
Maximum	1

Others Play Verse versus Shakespeare Baseline, Blocksize = 750

Play and Block	Date Late	Words	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability	
Tam2	1588	1	874	12	23	6	18	0	163	548	333	-667	14	10	3	6.214E-03	4.6325	1.8104E-02
		2	849	10	0	4	21	9	132	221	1000	-375	-47	10	3	6.214E-03	4.5571	2.2777E-02
		3	853	10	23	6	17	9	111	293	0	-333	2	10	4	4.426E-04	4.3593	4.0218E-02
		4	856	12	93	7	19	0	96	375	333	-500	12	10	3	6.214E-03	4.6765	1.5783E-02
		5	838	13	0	8	30	17	143	612	500	-556	4	10	3	6.214E-03	4.9603	6.1476E-03
		6	850	12	24	7	24	0	179	535	778	-846	-59	10	3	6.214E-03	4.8778	8.1694E-03
		7	833	9	0	11	19	18	128	363	1000	-846	-156	10	3	6.214E-03	5.5928	5.2751E-04
		8	878	15	46	9	21	0	115	377	333	-807	28	10	3	6.214E-03	5.6809	3.6062E-04
Jam4	1591	1	750	9	0	2	18	32	126	275	600	-667	70	10	3	6.214E-03	4.1511	6.9393E-02
		2	749	5	27	0	19	12	209	200	500	-875	1	10	1	3.352E-01	3.5270	2.5670E-01
		3	734	8	0	4	16	0	133	359	556	-727	-46	10	3	6.214E-03	4.1803	6.4494E-02
		4	720	6	56	6	20	35	198	273	800	-684	-14	10	0	1.000E+00	2.3817	8.4199E-01
		5	759	5	26	5	26	43	141	171	818	-524	-6	10	1	3.352E-01	3.1215	4.6325E-01
		6	748	5	0	10	26	11	207	236	1000	-684	15	10	1	3.352E-01	2.9856	5.4030E-01
		7	720	4	28	7	10	0	182	333	733	-600	13	10	1	3.352E-01	3.3856	3.2265E-01
		8	729	6	0	2	15	11	87	657	636	-833	-13	10	3	6.214E-03	4.7956	1.0755E-02
Cleo	1593	1	759	15	26	4	32	11	333	615	1000	-304	7	10	1	3.352E-01	5.5680	5.8614E-04
		2	804	7	0	2	39	41	204	323	600	-400	36	10	3	6.214E-03	3.2424	3.9668E-01
		3	657	10	30	6	42	0	167	94	333	-250	-14	10	2	5.815E-02	4.4233	3.3640E-02
		4	686	12	87	3	30	11	100	164	714	-310	15	10	2	5.815E-02	4.8571	8.7620E-03
		5	729	9	55	5	27	22	120	333	-200	-613	15	10	2	5.815E-02	3.9345	1.1551E-01
		6	718	18	28	22	24	44	143	73	1000	-572	-28	10	2	5.815E-02	6.8385	1.0419E-06
		7	717	7	0	11	16	33	256	39	-500	-818	-173	10	4	4.426E-04	5.9473	1.0793E-04
		8	729	12	55	31	13	11	211	238	1000	-484	-67	10	2	5.815E-02	5.2052	2.5165E-03
Dbet	1594	1	741	16	243	11	22	10	371	577	1000	-917	-71	10	3	6.214E-03	6.7508	1.7134E-06
		2	821	14	73	7	17	37	185	650	333	-1000	-133	10	3	6.214E-03	6.3075	1.8491E-05
		3	646	8	93	6	14	12	226	456	778	-667	6	10	0	1.000E+00	2.8440	6.2021E-01
		4	659	11	121	11	11	0	159	600	1000	-692	-101	10	3	6.214E-03	5.2562	2.0703E-03
		5	705	13	85	12	18	33	207	515	1000	-455	-70	10	2	5.815E-02	4.6269	1.8420E-02
		6	704	7	0	11	16	22	118	422	600	-846	-70	10	3	6.214E-03	4.0405	9.0682E-02
		7	715	13	56	7	24	0	191	798	1000	-800	9	10	3	6.214E-03	5.4943	7.9823E-04
		8	709	10	141	10	11	0	194	740	1000	-1000	41	10	3	6.214E-03	5.0110	5.1406E-03
JKIC	1594	1	753	6	53	4	13	0	250	491	750	-846	-31	10	1	3.352E-01	3.4177	3.0700E-01
		2	754	6	0	9	4	11	242	438	1000	-700	84	10	3	6.214E-03	3.8763	1.3113E-01
		3	753	6	53	12	9	22	290	314	1000	-733	23	10	0	1.000E+00	2.3636	8.4872E-01
		4	788	5	0	21	17	0	185	351	833	-750	8	10	2	5.815E-02	3.4682	2.8316E-01
		5	675	5	0	15	11	48	226	270	833	667	116	10	3	6.214E-03	6.3258	1.6837E-05
		6	682	5	0	20	7	25	247	461	538	-790	17	10	1	3.352E-01	3.0723	4.9101E-01
		7	685	5	0	17	5	48	410	242	1000	-556	32	10	2	5.815E-02	3.0008	5.3165E-01
		8	687	6	0	27	11	59	259	333	556	889	10	10	3	6.214E-03	6.8382	1.0436E-06

*Others Play Verse versus Shakespeare Baseline, Blocksize = 750*

Play and Block	Date Late	Words	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	Buckets Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (4.0%)	Continuous Composite Error	Continuous Composite Probability
Seja	1603	1	764	8	26	5	29	63	221	750	1000	-333	-11	2	5.815E-02	3.9421	1.1357E-01
		2	772	6	26	17	28	10	286	597	0	-375	34	0	3.352E-01	3.0865	4.8297E-01
		3	864	5	46	14	30	0	418	857	0	-259	-7	2	5.815E-02	3.4270	3.0253E-01
		4	777	5	26	13	33	0	188	328	-429	-364	48	3	6.214E-03	3.9879	1.0243E-01
		5	762	12	26	15	36	0	182	525	1000	-667	9	2	5.815E-02	4.5085	2.6311E-02
		6	751	4	27	10	30	21	247	547	600	-467	11	1	3.352E-01	2.5471	7.7276E-01
		7	792	6	25	7	47	10	190	452	500	-579	22	2	5.815E-02	3.3596	3.3561E-01
		8	804	6	75	15	28	10	294	482	1000	-158	-10	1	3.352E-01	2.8159	6.3574E-01
Wprz	1604	1	758	5	53	30	22	126	425	92	500	-1000	49	2	5.815E-02	5.0002	5.3417E-03
		2	734	4	0	35	17	122	207	135	500	-867	-19	2	5.815E-02	5.4286	1.0455E-03
		3	794	7	0	37	34	53	284	137	-333	-636	26	3	6.214E-03	4.9198	7.0759E-03
		4	769	6	78	29	20	55	253	203	0	-826	16	1	3.352E-01	3.3148	3.5846E-01
		5	737	8	0	28	25	48	226	128	-400	-895	-5	2	5.815E-02	4.4176	3.4186E-02
		6	750	3	240	28	20	80	184	84	-167	-1000	22	3	6.214E-03	5.4829	8.3680E-04
		7	748	5	80	42	39	108	325	0	429	-565	4	2	5.815E-02	5.6573	3.9966E-04
		8	743	14	27	34	43	122	322	226	-429	-1000	-20	4	4.426E-04	6.9715	4.8179E-07

*Discrete Discrimination Statistics*

Rejections	16	26	15	4	18	15	5	8	7	9	123
Percentage	29%	46%	27%	7%	32%	27%	9%	14%	13%	16%	22%
Blocks Tested	56	56	56	56	56	56	56	56	56	56	560

*Aggregates*

Composite Discrimination Statistics	42	37
	75%	66%

*Shakespeare Corpus Baseline: Consolidated Discrete Profile*

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	BoB5	BoB7	BoB8	Buckets Block
3	26	3	6	10	152	63	-146	-929	-69
10	236	28	51	157	505	712	1000	-83	81
Global Min									
Global Max									
Min to 1600		3	6				200		
Max to 1600		23	32				1000		
Min from 1600		12	12				-146		
Max from 1600		28	51				1000		
STMSHVS	845	13	24	44	49	284	636	-600	-1

*Composite Thresholds*

Composite Thresholds	Discrete	Composite
	3.352E-01	1.1715E-01
Sh Discrete Rejection Profile (See note in key)		
Minimum		0
Maximum		1

# APPENDIX NINE, POEMS: KEY TO TABLES FOR 470-WORD POEM TESTS

Column Heading and Test Sensitivities	Meaning	Shakespeare Profile
Date late	Latest supposed date of composition.	
Grade Level: G, E	Reading grade level score.	8 to 18
HC/20K: E	Hyphenated compound words per 20,000 words.	0 to 240
Fem Endings: P	Percentage of feminine endings of verse lines. Mostly machine counts.	3 to 40
Open Lines: E, P	Percentage of open or run-on verse lines.	7 to 28
Enclitics: P	Enclitic microphrases per 1000 lines.	17 to 196
Proclitics: P	Proclitic microphrases per 1000 lines.	183 to 589
No/no+not	Ratio of the number of occurrences of <i>no</i> to that of <i>no</i> plus <i>not</i> combined, times 1000.	0 to 800
Bob5	Bundles of badges 5. See text for components.	55 to 805
BoB7	Bundle of badges 7. See text for components.	0 to 1000
BoB8	Bundle of badges 8. See text for components.	-1000 to -167
Modal Block: G	Modal Score per Block.	-35 to 154
Discrete Rejections	Total number of rejections from tests above.	0 to 1
Discrete Composite Probability	See Table 2. Probability that observed rejections would occur by chance at Sh.'s avg. rejection rate.	4.378E-01
Continuous Composite Probability	See Table 2. Probability that observed composite probability score would occur by chance, here measured for Sh.'s lowest-probability block.	3.163E-01
Highlighting	Aqua = individual test rejection. Composite scores or ranges in yellow, except: for Shakespeare, gray or red = composite rejection; for others, gray or red = comp. non-rejection.	

## SUMMARY OF RESULTS FOR 470-WORD POEM BLOCKS

Of 89 Shakespeare blocks tested, 7 (8%) have more than one rejection in 11 tests. Of 40 non-Shakespeare blocks tested, 29 (73%) have more than one rejection. For blocks this small, accuracy is significantly lower than for larger blocks, but better than chance: 8% false negatives, 27% false positives, many close calls, 72% of 129 blocks correctly assigned. Some rejection calls, notably Bacon and Oxford, are still not close even at 470 words. *Test Sensitivities*: G = genre; T = time of composition; E = editing; P = prosody.

Shakespeare Poems Baseline Data, Blocksize = 470

Poem and Block	Date Late	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	no / (no+not)	BoB5	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (5.1%)	Continuous Composite Error	Continuous Composite Probability
Venus	1593	1	200	13	12	33	133	0	192	1000	-600	19	11	1	4.378E-01	3.0604	5.8814E-01
		2	160	3	7	17	217	0	118	500	-167	48	11	0	1.000E+00	3.2942	4.5577E-01
		3	200	23	8	17	267	200	630	1000	-1000	-35	11	0	1.000E+00	4.2483	8.0472E-02
		4	40	7	3	17	300	500	-290	0	-1000	68	11	2	1.054E-01	4.6519	2.7314E-02
		5	200	13	3	17	400	0	290	1000	-400	4	11	1	4.378E-01	3.3051	4.4968E-01
		6	120	20	12	167	217	250	405	1000	-500	34	11	0	1.000E+00	3.4583	3.6607E-01
		7	40	27	2	17	350	200	234	455	-200	-6	11	1	4.378E-01	3.9722	1.4956E-01
		8	80	33	10	17	283	429	300	1000	-733	55	11	0	1.000E+00	3.2237	4.9549E-01
		9	160	20	7	33	500	400	405	778	-600	60	11	1	4.378E-01	3.0803	5.7602E-01
		10	120	40	5	50	383	444	44	429	-667	31	11	1	4.378E-01	4.3577	6.1281E-02
		11	160	20	7	33	350	167	421	500	-530	34	11	1	4.378E-01	2.7312	7.6075E-01
		12	200	17	12	83	233	500	506	333	-333	42	11	0	1.000E+00	2.5923	8.2128E-01
		13	260	13	17	67	300	0	446	667	-778	55	11	1	4.378E-01	2.8824	6.8546E-01
		14	10	13	10	67	317	375	317	1000	-455	55	11	0	1.000E+00	1.5381	9.9674E-01
		15	160	10	10	0	333	800	-12	-200	-250	24	11	2	1.054E-01	4.0045	1.3980E-01
		16	10	20	7	83	217	500	119	1000	-334	65	11	0	1.000E+00	3.0755	5.7963E-01
		17	40	20	10	17	350	375	-55	556	-334	92	11	0	1.000E+00	2.6969	7.7654E-01
		18	40	10	13	100	400	500	195	600	-429	83	11	0	1.000E+00	2.0815	9.9916E-01
		19	120	10	12	0	217	429	578	200	-692	37	11	1	4.378E-01	2.6492	7.9700E-01
Lucrece	1594	20	140	13	13	38	358	167	405	429	-556	25	11	0	1.000E+00	1.5991	9.9538E-01
		1	80	3	35	33	233	0	723	1000	-334	69	11	1	4.378E-01	4.3784	5.8103E-02
		2	80	10	7	17	283	857	410	1000	-556	-26	11	1	4.378E-01	3.2919	4.5705E-01
		3	160	12	20	33	250	1000	632	714	-600	56	11	1	4.378E-01	3.5999	2.9600E-01
		4	200	17	17	67	383	375	440	1000	-684	175	11	2	1.054E-01	3.5283	3.3086E-01
		5	80	17	12	67	267	0	215	1000	125	26	11	1	4.378E-01	3.5389	3.2558E-01
		6	80	13	13	0	317	333	805	1000	-300	31	11	1	4.378E-01	2.8431	7.0583E-01
		7	180	7	13	17	200	1000	342	1000	-333	57	11	1	4.378E-01	3.5996	2.9614E-01
		8	11	20	10	67	317	0	317	0	-333	84	11	0	1.000E+00	2.7664	7.4401E-01
		9	120	20	10	33	150	500	280	1000	-667	9	11	1	4.378E-01	2.4244	8.8140E-01
		10	200	33	7	50	300	385	259	1000	-455	59	11	0	1.000E+00	3.3493	4.2570E-01
		11	120	8	17	50	233	125	404	1000	-800	61	11	1	4.378E-01	2.6216	8.0929E-01
		12	180	13	10	83	367	333	471	1000	-882	50	11	0	1.000E+00	2.3109	9.1538E-01
		13	140	8	18	0	317	0	79	0	-500	135	11	1	4.378E-01	3.5208	3.3462E-01
		14	300	12	12	17	200	250	533	1000	-429	78	11	1	4.378E-01	3.3314	4.3507E-01
		15	180	23	7	33	200	600	750	500	-636	40	11	0	1.000E+00	3.4768	3.5705E-01
		16	11	180	13	7	50	183	500	1000	-1000	31	11	0	1.000E+00	3.4844	3.5314E-01
		17	11	120	15	12	17	467	0	820	-778	93	11	1	4.378E-01	3.3620	4.1824E-01
		18	9	120	12	12	0	183	308	0	-619	76	11	1	4.378E-01	2.7293	7.6164E-01
Venus	1593	19	40	10	10	83	483	500	212	333	-200	40	11	0	1.000E+00	2.9813	6.3222E-01
		20	9	18	8	17	400	0	415	667	-369	124	11	0	1.000E+00	3.0041	6.1962E-01
		21	280	17	18	50	383	444	88	1000	-625	73	11	1	4.378E-01	2.9749	6.3573E-01
		22	8	12	23	17	233	0	-25	1000	-714	54	11	0	1.000E+00	3.3947	4.0046E-01
		23	10	120	8	17	33	667	304	200	-400	102	11	0	1.000E+00	2.4867	8.6083E-01
		24	14	120	12	23	100	383	0	627	0	76	11	0	1.000E+00	3.4451	3.7359E-01
		25	11	40	3	10	117	500	-30	1000	-625	114	11	0	1.000E+00	3.1041	5.6345E-01
		26	14	240	23	20	367	400	292	1000	-1000	159	11	1	4.378E-01	4.0584	1.2544E-01
		27	10	120	15	18	50	533	667	1000	-625	63	11	1	4.378E-01	3.3062	4.4907E-01
		28	14	80	10	13	83	283	-857	1000	-87	63	11	0	1.000E+00	2.2883	9.1918E-01
		29	10	180	8	28	50	500	12	0	-826	150	11	0	1.000E+00	4.3206	6.7328E-02
		30	9	120	3	17	83	350	571	500	-473	40	11	0	1.000E+00	2.0758	9.5999E-01
		31	100	13	13	74	315	0	515	333	-333	57	11	0	1.000E+00	2.3063	9.1474E-01

Shakespeare Poems Baseline Data, Blocksize = 470

Poem and Block	Date Late	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	no /no-no	BoB5	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (5.1%)	Continuous Composite Error	Continuous Composite Probability
Sonnets	1603																
1		11	180	7	10	143	321	0	469	1000	-556	128	11	0	1.000E+00	3.3292	4.3629E-01
2		17	280	7	20	71	536	142	758	0	-167	-2	11	1	4.378E-01	5.1852	4.7804E-03
3		11	40	13	13	54	143	400	400	1000	-333	44	11	1	4.378E-01	2.3732	8.9675E-01
4		14	40	3	28	36	286	400	492	1000	-530	6	11	0	1.000E+00	3.2378	4.8750E-01
5		15	80	3	3	89	536	200	271	1000	-250	98	11	1	4.378E-01	3.7121	2.4502E-01
6		13	40	10	25	107	357	0	531	778	-294	31	11	0	1.000E+00	3.1405	5.4277E-01
7		18	40	20	22	89	250	167	254	1000	0	-4	11	0	1.000E+00	4.3207	6.7311E-02
8		22	120	7	18	107	339	0	-16	1000	-286	168	11	2	1.058E-01	5.3489	2.6078E-03
9		14	80	3	10	107	214	375	333	600	-500	141	11	0	1.000E+00	2.8921	6.8035E-01
10		9	0	7	18	107	482	250	38	1000	-546	61	11	0	1.000E+00	3.1530	5.3567E-01
11		11	0	13	15	36	429	250	-123	500	-778	25	11	1	4.378E-01	3.0398	5.9971E-01
12		16	40	3	15	71	286	250	228	1000	-556	21	11	0	1.000E+00	2.5560	8.3553E-01
13		12	80	3	7	54	232	714	594	1000	-667	22	11	0	1.000E+00	2.8921	6.8035E-01
14		14	100	7	25	18	393	0	803	1000	-375	117	11	0	1.000E+00	3.6761	2.6108E-01
15		11	80	3	18	18	331	667	636	1000	-539	72	11	1	4.378E-01	2.5439	8.4013E-01
16		13	140	3	18	54	833	339	262	778	-636	29	11	1	4.378E-01	2.6042	8.1646E-01
17		12	100	0	5	36	339	800	333	1000	-667	22	11	2	1.058E-01	3.0465	5.9596E-01
18		17	0	18	71	375	339	250	606	1000	-909	39	11	1	4.378E-01	3.7450	2.3161E-01
19		11	120	3	17	54	339	500	538	1000	-333	50	11	0	1.000E+00	1.9311	9.7718E-01
20		11	40	0	13	0	232	500	492	1000	-263	43	11	2	1.058E-01	2.9837	6.3089E-01
21		14	140	7	22	18	357	167	493	1000	-714	236	11	0	1.000E+00	2.5693	8.3039E-01
22		10	180	27	12	54	286	500	231	429	-539	96	11	1	4.378E-01	4.5906	3.3616E-02
23		13	120	7	7	36	214	286	-154	333	-539	80	11	1	4.378E-01	2.9793	6.3332E-01
24		11	0	3	12	89	304	25	522	1000	-600	80	11	0	1.000E+00	2.6542	7.9545E-01
25		11	40	0	17	71	304	0	345	-1000	-600	56	11	2	1.058E-01	5.0386	7.9971E-03
26		10	0	3	12	36	339	462	429	1000	-400	-9	11	0	1.000E+00	2.6765	7.8568E-01
27		13	0	3	17	18	536	167	311	200	-333	18	11	0	1.000E+00	3.5777	3.1632E-01
28		13	40	7	20	18	196	500	96	714	-500	40	11	0	1.000E+00	2.5252	8.4709E-01
29		13	40	17	20	71	482	417	584	500	-429	151	11	0	1.000E+00	3.2705	4.6906E-01
30		13	80	22	23	0	375	333	291	1000	-500	30	11	1	4.378E-01	2.7049	7.7291E-01
31		13	40	10	20	18	250	417	360	333	-400	35	11	0	1.000E+00	2.2932	9.1799E-01
32		15	0	10	15	71	375	417	81	1000	-67	5	11	1	4.378E-01	3.3202	4.4128E-01
33		12	0	3	20	107	232	375	151	1000	-1000	48	11	0	1.000E+00	3.4490	3.7154E-01
34		11	80	7	8	196	304	333	343	1000	-857	143	11	0	1.000E+00	4.2660	7.7082E-02
35		9	200	0	10	8	464	77	49	1000	-250	30	11	1	4.378E-01	4.6838	2.4888E-02
36		16	40	10	13	71	554	0	53	600	-483	18	11	0	1.000E+00	3.7313	2.3731E-01
37		8	0	0	11	54	429	357	111	818	-483	18	11	1	4.378E-01	2.9726	6.3699E-01
38		13	180	9	23	143	589	375	173	1000	-455	35	11	0	1.000E+00	4.0356	1.3084E-01
Discrete Discrimination Statistics																	
Rejections		4	4	7	7	7	3	4	5	2	3	4	Aggregates				
Percentage		4%	4%	8%	8%	8%	3%	4%	6%	2%	3%	4%	7	8	8	22	25%
													89	89	89	89	89

Poems Baseline: Standard Statistical Profile

Blocks Tested	89	89	89	89	89	89	89	89	89	89	89	89
Mean	11.54	108.09	11.13	13.93	54.67	324.86	329.85	327.13	731.20	-521.01	59.71	59.71
Std Dev	2.64	72.87	8.10	6.27	40.57	101.02	249.03	241.71	384.72	236.77	47.58	47.58
Minimum	-7.00	0.00	0.00	2.00	0.00	133.33	0.00	-290.00	-1000.00	-1000.00	-35.17	-35.17
Maximum	22.00	300.00	40.00	35.00	196.43	589.29	1000.00	820.00	1000.00	125.00	236.24	236.24

Shakespeare Corpus Baseline: Consolidated Discrete Profile

Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	no /no-no	BoB5	BoB7	BoB8	Modal Block
8	0	3	7	17	183	0	-55	0	-1000	-35
18	240	40	28	196	589	800	805	1000	-167	154
Global Min										
Global Max										
Min to 1600										
Max to 1600										
Min from 1600										
Max from 1600										

Other Poets versus Shakespeare Baseline, Blocksize = 470

Poem and Block	Grade Level	HCW /20K	Fem Endings (%C)	Open Lines (%C)	Enclitics /1000 lines	Proclitics /1000 lines	no/(no+not)	BoB5	BoB7	BoB8	Modal Block	Number of Tests	Discrete Rejections	Discrete Composite Probability (5.1%)	Continuous Composite Error	Continuous Composite Probability
BacSh1	12	0	3	3	0	115	250	595	1000	-334	219	11	4	1.671E-03	5.1035	6.389E-03
BacSh2	9	0	3	10	33	197	333	437	1000	-429	618	11	11	4.378E-01	12.0493	<1.000E-15
BacSh3	18	0	10	9	0	157	333	804	1000	-500	277	11	3	1.607E-02	6.2166	6.0831E-05
BarnesSh1	7	38	21	12	24	167	333	460	0	-250	150	11	2	1.054E-01	4.1618	9.8744E-02
BarnesSh2	6	0	23	20	16	164	0	342	0	59	136	11	4	1.671E-03	5.2040	4.4665E-03
BarnesSh3	4	127	19	21	17	293	500	77	0	-273	132	11	1	4.378E-01	4.4688	4.5751E-02
CheSh1	20	172	14	28	31	492	333	571	1000	-556	192	11	2	1.054E-01	5.3456	2.6407E-03
CheSh2	22	37	11	23	42	465	0	273	1000	-177	110	11	1	4.378E-01	5.1338	5.7430E-03
CheSh3	18	0	12	32	62	246	0	302	1000	-333	22	11	1	4.378E-01	4.5472	3.6876E-02
DadSh1	11	215	17	18	14	141	667	49	1000	0	46	11	3	1.607E-02	4.0024	1.4042E-01
DadSh2	15	42	21	26	18	105	500	129	0	-500	0	19	1	4.378E-01	4.3349	6.4943E-02
DadSh3	11	44	4	33	18	70	500	-116	667	-833	157	11	4	1.671E-03	5.2767	3.4208E-03
DonSh1	9	398	3	30	45	313	500	298	0	143	31	11	3	1.607E-02	6.0571	1.2993E-04
DonSh2	12	177	5	21	27	173	455	524	1000	91	163	11	2	1.054E-01	4.2358	8.2936E-02
DonSh3	12	70	15	19	27	173	455	143	778	-143	46	11	2	1.054E-01	2.7188	7.6632E-01
FiamSh1	19	148	9	15	0	295	500	415	1000	-200	26	11	2	1.054E-01	3.7083	2.4705E-01
FiamSh2	22	202	37	17	28	113	0	735	1000	0	0	11	3	1.607E-02	6.5677	1.0290E-05
FiamSh3	20	236	30	19	18	175	0	803	1000	-400	12	11	2	1.054E-01	5.4647	1.6650E-03
GreSh1	12	124	7	7	0	115	375	500	1000	-636	80	11	2	1.607E-02	3.0260	6.0743E-01
GreSh2	12	41	8	15	0	82	1000	257	1000	-333	85	11	3	1.607E-02	4.1698	9.6932E-02
GreSh3	6	113	0	18	0	152	750	447	250	-714	118	11	4	1.671E-03	4.2891	7.2827E-02
IdeaSh1	13	131	12	14	0	246	667	484	1000	67	115	11	2	1.054E-01	3.5965	2.9761E-01
IdeaSh2	4	44	9	4	18	228	824	-83	-1000	-647	98	11	5	1.229E-04	6.4270	2.1343E-05
IdeaSh3	7	70	8	8	85	155	0	429	833	-333	80	11	2	1.054E-01	3.2359	4.8858E-01
MheSh1	10	0	3	13	11	206	500	70	1000	250	123	11	1	4.378E-01	4.6188	3.0078E-02
MheSh2	10	118	0	10	30	15	269	0	356	-429	103	11	2	1.054E-01	3.3843	4.0609E-01
MheSh3	8	0	13	23	53	427	333	484	1000	-333	111	11	0	1.000E+00	3.1391	5.4357E-01
MidgSh1	16	847	8	16	0	328	333	469	0	-636	77	11	2	1.054E-01	10.5936	<1.000E-15
MidgSh2	9	40	9	6	16	94	0	111	500	-579	72	11	3	1.607E-02	3.5600	3.1519E-01
MidgSh3	11	408	20	3	14	113	1000	459	0	-750	86	11	5	1.229E-04	6.2480	5.2202E-05
NushSh1	7	78	2	14	31	200	333	150	1000	-530	145	11	2	1.054E-01	3.2408	4.8581E-01
NushSh2	6	80	6	10	81	387	250	385	1000	-818	107	11	1	4.378E-01	3.0608	5.8792E-01
NushSh3	7	82	6	17	11	426	700	433	667	-800	173	11	3	1.607E-02	3.9253	1.6457E-01
OxSh1	9	39	0	8	16	127	308	714	1000	-59	220	11	5	1.229E-04	5.2460	3.8317E-03
OxSh2	9	40	0	7	0	115	1000	120	1000	-500	267	11	5	1.229E-04	6.2132	6.1842E-05
OxSh3	6	0	0	4	21	128	500	-304	0	538	344	11	7	2.468E-07	9.0628	5.7000E-13
QE1poems	9	0	10	10	0	250	545	370	1000	-250	78	11	1	4.378E-01	2.9376	6.5605E-01
SpamSh1	11	221	3	18	17	317	500	254	1000	231	96	11	1	4.378E-01	4.0564	1.2508E-01
SpamSh2	12	43	12	13	0	367	200	632	1000	-530	20	11	1	4.378E-01	2.4315	8.7916E-01
SpamSh3	12	70	13	11	13	360	250	59	1000	-158	79	11	2	1.054E-01	2.4632	8.6883E-01

Discrete Discrimination Statistics

Rejections Percentage	15	3	5	13%	8%	40	40	35%
Blocks Tested	40	40	40	40	40	40	40	40

Aggregates

29	73%	40	30	75%	40
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Composite Discrimination Statistics

Shakespeare Corpus Baseline: Consolidated Discrete Profile

	Grade Level	HCW /20K	Fem Endings	Open Lines	Enclitics /1000 lines	Proclitics /1000 lines	no/(no+not)	BoB5	BoB7	BoB8	Modal Block
Global Min	8	0	3	7	17	183	0	-55	0	-1000	-35
Global Max	18	240	40	28	196	589	800	805	1000	-167	154
Min to 1600											
Max to 1600											
Min from 1600											
Max from 1600											

Composite Thresholds

Discrete	Continuous
4.378E-01	3.163E-01

Sh Discrete Rejection Profile (See note in key)

Minimum	0
Maximum	1



## APPENDIX TEN: KEY TO CHRONOLOGICAL INDICATORS IN SHAKESPEARE PLAYS

Column Heading	Meaning
Title	Short title of play.
Riv Seq	<i>Riverside</i> Shakespeare late dating sequence.
MLE Seq	Midline Speech Ending sequence.
Hess Seq	W. Ron Hess recent Oxfordian dating sequence.
Rdate Late	Late <i>Riverside</i> Shakespeare dates.
Oxford Clark Late	Eva Turner Clark old Oxfordian dates.
Oxford Ogbn Sr	Dorothy and Charlton Ogburn old Oxfordian dates.
Hess	W. Ron Hess new Oxfordian dates.
1 <sup>st</sup> clear	First clear recorded mention of the play.
1 <sup>st</sup> clear - Riv	Years from 1 <sup>st</sup> clear mention to <i>Riverside</i> date.
1 <sup>st</sup> clear – Hess	Years from 1 <sup>st</sup> clear mention to Hess date.
F. End Halli	Feminine Endings, per Halliday.
OL% TC	Open-Line Percentage per Textcruncher computer counts.
ML Sp. End	Midline Speech Endings, Percentages, per Halliday.
Light End	Light Endings Percentages, per Halliday.
Weak End	Weak Endings Percentages, per Halliday.
<i>Most</i> /10K	<i>Most</i> 's per 10,000 words.
Colloq/20K	Colloquialisms per 20,000 words, adapted from Wells & Taylor.
Arch/20K	Archaisms per 20,000 words, adapted from Wells & Taylor.

### SUMMARY OF RESULTS

If the *Riverside* play sequence is roughly correct, eight of Shakespeare's listed style habits clearly evolved during his writing lifetime, all steadily increasing except archaisms such as "hath," "-eth," etc., which decreased. The best stylistic sequencer for plays is Midline Speech Endings. These trends, applied to Oxford's early poems, could keep his very low rates of feminine endings and open lines from disqualifying him as a Shakespeare claimant. But they badly damage his case by continuing apace for years after his death. New Oxfordian redating tries to move all the plays earlier, while keeping vestiges of the *Riverside* sequence. But it is mostly pulled from a hat; it improbably assumes an 11-year average delay between a play's first performance and its first clear recorded mention, and it all but wipes out the trends which otherwise would shelter Oxford from a clear mismatch. Dates in bold are considered more firm than others, either by Hess or by us.

## Appendix Ten: Chronological Indicators in Shakespeare's Plays, Riverside Late Dating

Title	Rdate										1st										
	Late					Oxld					Oxld					1st					
	Clark		Ogbn		Hess	clear															
	Seq		Seq																		
	Seq		Seq																		
	Clear - Riv		Clear		F.End %	ML	Light end.	Weak end.	Most	q	Collo		Arch								
		Hess	Halli	TC	sp.en	end.	end.	/10K	/20K												
1lh6	1	1	1590	1587	1587	1592	2		8	14	1	3	1	7	31	143					
3h6	2	2	1591	1580	1581	<b>1580</b>	1	12	14	12	1	3	0	2	40	75					
2h6	3	3	1 1591	1579	1581	1579	3	15	14	14	1	2	1	6	55	83					
r3	4	6	3 1593	1581	1581	<b>1581</b>	4	16	20	17	3	4	0	11	15	90					
tit	5	5	8 1594	1577	1577	<b>1584</b>	0	10	9	15	3	5	0	5	17	108					
err	6	4	14 1594	1577	1577	<b>1587</b>	0	7	17	12	1	0	0	9	38	82					
tgw	7	8	4 1594	1579	1579	1582	4	16	18	16	6	0	0	5	50	80					
shr	8	7	5 1594	1579	1579	1582	13	25	18	11	4	1	1	3	75	81					
r2	9	9	6 1595	1582	1582	1583	2	14	11	23	7	4	0	8	19	65					
lll	10	10	7 1595	1579	1579	1583	3	15	8	14	10	3	0	25	43	56					
jn	11	11	17 1596	1581	1582	<b>1590</b>	2	8	6	23	13	7	0	7	27	130					
rom	12	13	19 1596	1582	1583	<b>1591</b>	1	6	8	16	15	6	1	7	47	99					
mnd	13	14	9 1596	1581	1583	1584	2	14	7	15	17	0	1	12	31	98					
1h4	14	12	21 1597	1584	1584	<b>1592</b>	1	6	5	29	14	5	2	5	26	115					
wiv	15	18	10 1597	1585	1585	1585	5	17	27	16	21	1	0	4	128	60					
mov	16	20	11 <b>1597</b>	1579	1579	1585	1	13	18	27	22	6	1	9	24	99					
2h4	17	15	12 1598	1585	1585	<b>1585</b>	2	15	16	27	17	1	0	16	13	100					
h5	18	16	22 <b>1599</b>	1586	1586	<b>1592</b>	1	8	21	26	18	2	0	16	69	117					
ayl	19	21	25 <b>1599</b>	1582	1582	<b>1593</b>	1	7	26	23	22	2	0	17	59	57					
jc	20	17	15 <b>1599</b>	1583	1583	1587	0	12	20	22	20	10	0	15	50	82					
ado	21	19	16 1599	1583	1583	1587	1	13	23	19	21	1	1	12	35	84					

## Appendix Ten: Chronological Indicators in Shakespeare's Plays, Riverside Late Dating

Title	Rdate										Oxid										1st										Collo														
	Late					Clark					Ogbn					Hess					clear					1st					Clear					OL					Arch				
	Late					Clark					Ogbn					Hess					clear					1st					Clear					OL					Arch				
	Late					Clark					Ogbn					Hess					clear					1st					Clear					OL					Arch				
	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq	Riv	Seq	Seq	Seq	Seq										
ham	22	25	27	1601	1585	1585	1585	<b>1594</b>	1602	1	8	23	27	52	8	0	27	156	52	52	23	26	23	36	3	1	17	92	46	47	43	55	42	52											
tn	23	23	32	<b>1602</b>	1580	1580	1580	<b>1600</b>	1602	0	2	26	23	36	3	0	17	92	46	36	26	23	36	3	1	17	92	46	47	43	55	42	52												
tro	24	22	18	<b>1602</b>	1583	1583	1584	1590	1603	1	13	24	26	31	6	0	13	84	47	31	24	26	31	6	0	13	84	47	43	55	42	52													
aww	25	31	20	1603	1579	1579	1579	1591	1623	20	32	29	32	74	11	2	18	205	43	74	29	32	74	11	2	18	205	43	47	43	55	42	52												
mfn	26	24	23	1604	1581	1581	1581	1592	1604	0	12	26	30	51	7	0	25	159	55	51	26	30	51	7	0	25	159	55	43	55	42	52													
oth	27	26	24	1604	1583	1583	1583	1592	1604	0	12	28	24	54	2	0	22	183	42	54	28	24	54	2	0	22	183	42	47	43	55	42	52												
lr	28	27	26	<b>1605</b>	1589	1589	1589	1593	1606	1	13	29	31	61	5	1	20	164	52	61	29	31	61	5	1	20	164	52	47	43	55	42	52												
mac	29	32	33	1606	1589	1590	1590	<b>1600</b>	1611	5	11	26	35	77	21	2	15	232	29	77	26	35	77	21	2	15	232	29	47	43	55	42	52												
ant	30	33	28	1607	1579	1580	1580	1595	1608	1	13	27	41	78	71	28	25	251	21	78	27	41	78	71	28	25	251	21	47	43	55	42	52												
tim	31	28		1608	1576	1576		1623	1623	15		22	31	63	16	5	20	222	51	63	22	31	63	16	5	20	222	51	47	43	55	42	52												
cor	32	34	29	1608	1581	1580	1580	1596	1623	15	27	28	46	79	60	44	19	345	29	79	28	46	79	60	44	19	345	29	47	43	55	42	52												
persh	33	29	35	1608	1577	1577	1577	<b>1603</b>	1608	0	5	22	34	71	15	5	19	164	65	71	22	34	71	15	5	19	164	65	47	43	55	42	52												
cym	34	35	30	1610	1578	1578	1578	<b>1598</b>	1611	1	13	31	47	85	78	52	17	250	18	85	31	47	85	78	52	17	250	18	47	43	55	42	52												
wt	35	37	31	1611	1586	1586	1586	<b>1599</b>	1611	0	12	33	48	88	57	43	20	307	17	88	33	48	88	57	43	20	307	17	47	43	55	42	52												
tmp	36	36	34	1611	1583	1583	1583	1600	1611	0	11	35	46	85	42	25	26	231	25	85	35	46	85	42	25	26	231	25	47	43	55	42	52												
h8sh	37	30		<b>1613</b>	1601	1603		1613	1613	0		32	51	72	45	37	22	254	30	72	32	51	72	45	37	22	254	30	47	43	55	42	52												
anksh	38	38		1613				1613	1634	21		30	46	92	50	34	17	335	19	92	30	46	92	50	34	17	335	19	47	43	55	42	52												