Jonathan Edwards and Thomas Foxcroft: Pursuing Stylometric Traces of the Editor

Michał Choiński and Jan Rybicki

ABSTRACT

Jonathan Edwards (1703-58) is a major figure in early American culture. Yet in spite of a plethora of studies on Edwards's numerous religious and philosophical publications, the relationship between him and Thomas Foxcroft (1697-1769), his editor and literary agent, has yet to be extensively studied. The aim of our article is to discuss and quantitatively measure the extent of Foxcroft's impact on Edwards's writings. To this end, we have adopted the stylometric methodology. In our research, we conducted our analysis with two quantitative methods: word frequencies are compared between various texts using the Delta procedure; then, the “rolling classify” method is employed to look for particular traces of the editor's signal in consecutive segments of several of Edwards's treatises. Our main experiment, preceded by a trail that tests how divergent Edwards's and Foxcroft's stylometric signals are, revealed that Edwards's late, most influential works exhibited numerous traces of his editor's textual fingerprint. We managed to identify these fragments and in this article we study them in the context of the historical evidence on Foxcroft and Edwards's cooperation, including their opulent correspondence. These results of our research have two consequences. The first is that we have now produced a quantitative confirmation of the extent of the collaboration between two major colonial authors. The fact that the quantitative agrees well with the historical evidence shows, secondly, that editorial traces can indeed be found with stylometry, perhaps to a greater degree than we might have anticipated.

1 Introduction

Jonathan Edwards is generally considered the pre-eminent and most versatile thinker in early American history. His impact on the development of theological thought and the preaching tradition of the colonial period was profound and long-lasting. Today, he remains one of the best-studied figures of this period and different parts of his impressive output are continually reprinted by academic, commercial, and religious publishing houses. Over the course of his life, Edwards authored an impressive body of work with more than a thousand sermons, hundreds of letters, and a number of theological treatises. Over the last six decades, the Jonathan Edwards Center at Yale University has edited and published most of these texts in their complete form as The Works of Jonathan Edwards. Phillip Gura, a former editor of Early American Literature, described the series of

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1 We wish express our gratitude to Professor Kenneth Minkema from the Jonathan Edwards Center at Yale University for his kind suggestions and help with the final version of this article. The research presented here is part of the OPUS research project 2014/13/B/HS2/00905, supported by Poland’s National Science Center.
almost thirty volumes as the “most important editorial project in American cultural history in the past 50 years” (149). Edwards is so well documented—with a mountain of critical literature available to scholars—that very few stones seem to have been left unturned in the life of the Northampton theologian.

However, while the philosophical and theological aspects of Edwards’s texts have been studied in depth by historians, theologians, and literary scholars, there are but a few studies that emphasize the production process of his sumptuous oeuvre. Most biographies focus on Edwards the theologian, the revivalist, the philosopher or the family man—while Edwards the publisher remains somewhat in the background. Some fairly recent publications—Peter J. Thuesen’s examination of Edwards’s book collection (2008), Wilson Kimnach and Kenneth Minkema’s comprehensive study of the logistics of Edwards’s writing process (2012), and Jonathan M. Yeager’s study of Edwards in the context of colonial print culture (2016)—offer much needed insights into the processes that governed the genesis of his publications and their subsequent functioning among his contemporaries. This article adds to this expanding understanding of Edwards as an author and seeks to investigate the textual relationship between this revivalist preacher and his editor and literary agent, Thomas Foxcroft. By turning to stylometry—a digital method of textual analysis—this study aims at determining the extent to which Foxcroft’s authorial fingerprint remains discernible in Edwards’s output. The reason for the use of stylometry as a method of inquiry is that it can help us greatly in navigating our way through the nuances of texts that would otherwise remain hidden for the naked eye and—in this context—to understand the extent to which Edwards’s texts are indeed rightfully attributed to the Northampton thinker.

2 The Historical Context of the Cooperation of Edwards and Foxcroft

During Jonathan Edwards’s lifetime, theological disputes grew increasingly heated in New England. The market for treatises, published sermons, and pamphlets increased dramatically, especially in Boston and its vicinity. The printers Kneeland & Green and Rogers & Fowle were particularly active in the 1740s and both drew on an established readership and an existing roster of authors. Among the numerous religious debates of the period, the controversy surrounding colonial revivals seems to have occupied a particularly significant place. Edwards was at the heart of this debate. Local awakenings such as the revival ‘harvests’ of the mid-1730s in Northampton, as part of which he witnessed three hundred people experience the ‘New Birth,’ convinced Edwards that their zeal furthered the advancement of religion. Although religious enthusiasm subsided somewhat during the spring of 1735, the Northampton harvest paved the way for the tempestuous events of the Great Awakening. Fueled by the arrival of George Whitefield four years later and the popularity of his theatrical pulpit oratory,2 the Great Awakening swept through the colonies (see Kidd 2007).

2 For a comprehensive study of Whitefield’s theatrical preaching oratory see Harry Stout’s Divine Dramatist (1991).
In the revival debate, the fundamental line of division ran between the Old Lights and the New Lights. To say that the former were critics of the Great Awakening and the latter its advocates would be to make too simple a distinction. The divide between the two groups of preachers and men of letters stemmed from their differing views on religion and the extent to which they understood religious experience as fundamentally emotional or rational. Supporters of the Great Awakening argued that mass enthusiasm, religious exaltation, and its spontaneous manifestation constituted visible marks of the work of God—as Edwards argued so vigorously in his commencement address at Yale in 1741. Little wonder that, in this emotive context, a figurative, antagonistic, and evocative style of preaching, the “rhetoric of the revival” (see Choiński 2016), was welcomed as an appropriate means to advance religious belief. By contrast, the Old Lights, for whom Charles “Old Brick” Chauncy of Boston’s First Church would become one of the lead spokesmen, embraced more liberal views and adhered to a rationalist outlook on religion and conversion. These preachers could not help but view the massive crowds that assembled during the revival and the oftentimes excessive behavior of both shepherds and their flocks as a threat to established religion. Thus, the dispute between Edwards and Chauncey about the merits of the Great Awakening was in fact a theological and philosophical conflict between two visions of religion: the post-Augustinian “religion of affections” and “rational religion,” with its post-Aristotelian (and post-Thomistic) roots. The arguments employed by both sides played off the interrelation between emotions and religious experience, and laid the foundations of contemporary religious psychology (see Hoopes 1983).

Edwards’s numerous publications provided him with a platform to defend the Great Awakening, as well as to propagate his doctrinal thought. In the antagonistic context of the public debate about religion, disseminating one’s views with the help of regular publications became pivotal. Yet with at least two manuscripts created in the process—one, a “fair copy” for the printer, and the other one, a penultimate copy with “deletions, insertions, and dislocations” (Kimnach and Minkema 692)—Edwards’s writing practice required a diligent and meticulous editor. Initially, Foxcroft was not the straightforward choice for the job. As Yeager observes, at first glance, Thomas Prince would have seemed a much more obvious candidate (cf. 94). Not only was Prince a good friend of Edwards, he was also a noted preacher and author, and knew the publishing market in Boston. A graduate of Harvard who was ordained by Joseph Sewall to become the pastor of Old South Church in 1718, Prince published sermons, memoirs, brief historical accounts, and A Chronological History of New England, in the Form of Annals (1736). However, as much as Edwards appreciated Prince’s friendship and intellect, he had considerable reservations as to his reliability and thoroughness, which he openly expressed in his correspondence. In 1747, in a letter to William McCulloch, Edwards complained of Prince’s “forgetfulness,” leading to the withholding of correspondence from abroad; likewise, in 1748, he asked John Erskine not to send his letters from Scotland via Prince, “who is so forgetful, that his care is not to be depended on” (Letters 237).

Edwards would have had little patience for such an absentminded agent, and Thomas Foxcroft proved a much more felicitous candidate. Six years older than
Edwards, and another graduate of Harvard, Foxcroft joined the First Church of Boston as junior minister to Charles Chauncy in 1717, Edwards’s chief antagonist in the revival debate. Foxcroft was a prolific author and showed considerable managerial and interpersonal skills, collaborating with such well-known ministers of his era as Jonathan Dickinson and Joseph Bellamy. After almost two decades of service in Boston, Foxcroft was afflicted with paralysis—yet he continued to preach until his death thirty-six years later. In his funeral sermon for Thomas Foxcroft, delivered on 18 June 1769, Charles Chauncy praised the learning of his deceased junior pastor: “[he] was a good grammarian, well acquainted both with Latin and Greek, especially the new-testament Greek, in which his criticisms were frequent, and just” (Funeral Sermon 26). As a consequence, Foxcroft enjoyed “high reputation in the learned world” and was recognized by his “knowledge of divinity” (26). Obviously, Chauncy wanted to portray Foxcroft in a positive light upon his death. Yet even though they did not agree about the merits of the Great Awakening, the skills Chauncy highlighted in his sermon must have proven useful in Foxcroft’s work on Edwards’s texts.

During his service in Northampton and Stockbridge, Edwards relied on Foxcroft’s expertise as an editor and literary agent for many of his best-known publications, including The Life of Brainerd (1749), An Humble Inquiry (1749), Freedom of Will (1754), and Original Sin (1758). Edwards placed great trust in Foxcroft’s erudition and skill to carry out corrections as he intended them. As Yeager emphasizes, when one considers “Edwards’s meticulous nature and high standards, it is remarkable how liberal was the dose of trust and flexibility that he dished out to his friend when it came to overseeing the publication of his manuscripts” (96). Foxcroft sometimes included Edwards’s corrections verbatim, exactly as indicated by the author; at other times, he paraphrased them while preserving the author’s thought. Edwards entrusted Foxcroft not only with editing and final corrections but also with the publication process itself and the aesthetic features of the published book. As Edwards wrote from Stockbridge on 30 June 1752 regarding Misrepresentation Corrected and Truth Vindicated: “I should be glad that you would endeavor that this book may be printed in a pretty good paper and character, and may be printed correctly, and that particular care may be taken that the printer don’t skip over a whole line as they sometimes do” (Letters 486).

Likewise, in a letter sent from Stockbridge on 24 May 1753, Edwards instructed Foxcroft on how he would like to see his books published: “I humbly thank you for the readiness you manifest to assist in the publication of what I have written against Arminians, in promoting subscriptions, and in the care of the press” (Letters 596). Foxcroft’s role here was that of a secretary and an executive manager, as Edwards wanted Samuel Kneeland, the Boston printer of his works, to use particular fonts that he liked—and Foxcroft’s task was to make it happen:

> With respect to the character, I should be glad the book might be printed in the best character Mr. Kneeland has, and that it should be done every way in as handsome a manner as may be. I think the character in which my answer to Mr. [Solomon] Williams is printed is better than that of my book on Religious Affections, but Mr. Hawley tells me that Mr. Kneeland has sent for new types; perhaps they will be better than any he now has. (Letters 596)
Foxcroft was also a trusted friend and counselor to Edwards. After 1749, the idea that reason, as God's gift for the human mind, was to be employed for the pursuit of truth gained in popularity, and a more rationalist approach was advocated by such liberal preachers as Jonathan Mayhew of Old West Church in Boston. Edwards viewed this tendency as irreconcilable with his Calvinist standpoint, threatening his revival work and religious notions vital to it, such as the doctrine of the Trinity. Edwards sought allies to resist what he saw as liberal laxity in matters of religion in Boston. When his attempts to convince Edward Wigglesworth of Harvard College to preach against Mayhew failed, he turned to his friend and editor to profess his disappointment with the way matters of church were progressing. In a candid letter, Edwards presents his literary agent with an ominous vision of religious downfall in New England, as the “guilt of the land (which already is great, and awfully testifying against by heaven at this day) will be greatly increased by the neglect, if none should now appear to attempt a full vindication of the doctrine of Christ’s divinity” (Letters 695). Edwards trusted that his sentiment would be understood by Foxcroft.

Throughout the 1750s in Stockbridge, Edwards entered into a “comfortable rhythm” (Yeager 99) of providing consecutive manuscripts to be printed in Boston by Kneeland, while Foxcroft acted effectively as his impresario. The arrangement worked well until 1758, when Edwards was summoned to become the rector of Princeton, and soon after passed away after a smallpox inoculation. Given the prolonged and extensive nature of their cooperation, the influence of Foxcroft’s thought and style on Edwards’s writings seems to be substantial and demands a close investigation—aided by digital methods of authorship attribution. Stylometry seems a fitting tool to be employed for such a study, insofar as it allows us to compare and contrast authorial signals not only for collections of texts but also for fragments within texts. As a method, stylometry helps us measure the exact extent of Foxcroft’s influence on Edwards’s writings. Finally, stylometric authorship attribution enables us to better understand the editorial processes that determined the final shape of a number of Edwards’s theological works, which to this day remain vital for the study of religion in America.

3 Quantitative Analysis

Our choice of method—based on frequencies of specific words for the establishment of the relationship between Edwards and Foxcroft—was an obvious one: differences between authors in the proportional usage of the highest-ranking words in frequency lists have been successfully used in authorship attribution at least since the seminal study of the “Federalist Papers” by Mosteller and Wallace (1964). Burrows established the classical approach (2002), and his Delta formula has found numerous applications and modifications (see Hoover 2004, Argamon 2008, Smith and Aldridge 2011, Evert et al. 2017); this is why one of the latest versions is used as presented below.

Perhaps the most characteristic feature of all these methods is that they are based on words that one does not attach much significance to in close reading:
the, a, it, do, can and other function words rather than content words such as God, sin, or Heaven. The former rarely make it into the 100 most frequent words in any text or any collection of texts, and it is an empirical fact that these 100 word-types usually make up half of any text in any natural language (cf. Burrows, Computation 1). These words are usually enough to tell one author from another—possibly because each writer has more or less unconscious preferences of ‘grammatical’ word usage. Recent studies, including those quoted above, have shown that importing more words into the study makes attribution somewhat more reliable; here, the analyses were done for the 100 and for the 1000 most frequent words.3

For the purposes of this study, the reference list of words was jointly based on the entire collection of texts: those by Edwards and those by Foxcroft, with the corpora taken from the Early American Imprint Series. In a second step, the frequencies of those words were identified in each individual text, and these numbers were compared between each pair of texts to calculate a distance measure, or degree of dissimilarity, between them. This distance measure, Cosine Delta (Δ∠), as it is often referred to, for two texts (T and T1), measures the angle α between the two texts (the greater the angle, the greater the distance), and this angle is given by the formula

\[
\cos \alpha = \frac{\sum_{i=1}^{\text{numWords}} x_i y_i}{\sqrt{\left(\sum_{i=1}^{\text{numWords}} x_i^2\right) \left(\sum_{i=1}^{\text{numWords}} y_i^2\right)}}
\]

where \( x = z(T) \) and \( y = z(T_i) \), and \( z(T) \) is the value of z-score of word frequency in text \( T \), calculated according to the usual formula,

\[
z(T) = \frac{f_w(T) - \mu_w}{\sigma_w}
\]

where \( f_w(T) \), in turn, is the raw frequency of a given word \( w \) in text \( T \), \( \mu_w \) the average frequency of word \( w \) in the set of texts to which \( T \) belongs, and \( \sigma_w \) is the standard deviation of the frequency of word \( w \) in that same set of texts (see Smith and Aldridge 2011).

This process produces a whole matrix of distances. Such a matrix might be enough to find pairs of similar texts with the shortest distance between them—and it is a stylometric axiom that these are usually authored by the same hand. Yet it is even more informative to process such a matrix with a multivariate statistical method. In this case, hierarchical clustering (see Ward 1963) was used to choose the texts that were each other’s nearest neighbors within this matrix. This, in layman’s terms, is a process that may be likened to finding pairs of nearest cities in a table (or, more precisely, a matrix) of distances between several cities in a country—such as the ones found in the road atlases that have now been replaced.

3 It may be argued that the latter value extends the analysis from grammatical form (represented by the function words that dominate the very top of a word frequency rank list) to lexical content (as more meaningful words begin to appear further down that list).
so completely by GPS software. For a matrix of major American cities such as New York, Boston, Los Angeles, San Francisco, Houston, and New Orleans, for instance, hierarchical clustering would pair New York with Boston, New Orleans with Houston (and then those two pairs would probably become paired at a higher level of clustering hierarchy), while the third pairing, that between San Francisco and Los Angeles, would be an outlier. In our case, of course, the cities are replaced with individual texts, and the distances between them are those calculated with the above Delta formula. For more solid results, hierarchical clustering was performed for multiple lengths of the most-frequent-word frequency list (from 100 to 2000 with an increment of 100) to produce a consensus tree that shows the most consistent nearest neighbors among the texts studied. This was based on individual cluster analyses for each value of the word frequency length parameter. For the above range of values, as many as 120 results would be pooled in such a consensus approach. Up to this point, the entire workflow was made with stylo (see Eder et al. 2013), a package for R, the statistical programming environment (see R Core Team 2014).

This consensus approach is useful for examining relatively small collections of texts. When their number increases, diagrams usually become too cluttered, which prompted us to use network analysis. This part of the procedure is based on attributing ‘weights’ of different values (3, 2 and 1 in this case) to, respectively, any pair of nearest-neighbors, next-to-nearest-neighbors, and next-to-next-to-nearest neighbors (see Eder 2017). Thus, pairs of texts that are often in their more or less immediate neighborhood accumulate more weight with every iteration of the clustering procedure. The software used to process the output from stylo was Gephi (see Bastian et al. 2009). In this study, the gravitational algorithm Force Atlas 2 was used. This can be likened to applying gravitational pull to all data points (texts); as a result, those connected by weaker links (lesser similarity) allow themselves to be pulled further apart, while the stronger links keep their two extremities together until a balance is reached in the entire system which best reflects the overall pattern of similarity and difference between pairs of texts (see Jacomy et al. 2014).

The above method was applied to compare collections of texts by Edwards and Foxcroft. Yet it was at least equally important to look for traces of the latter in the writings of the former. Stylo allows such an investigation by comparing consecutive fragments of texts suspected to be a collaboration of two or more authors against texts known to be of individual authorship by either candidate (see Eder 2016). This state-of-the-art technique is known as ‘rolling classify’ and uses support vector machines, a supervised machine learning model that finds the best separation between reference texts—in this case, individual texts by Edwards and by Foxcroft dated before their collaboration or known not to have been edited by the latter. The model then applies the same classification to equal-sized fragments of a collaborative (or edited) text. To explain this approach in more simple terms: texts of known (or highly plausible) individual (non-collaborative) authorship by either writer are used to produce a model of each writer’s individual word usage. This model is applied to consecutive and equal-sized samples of the texts suspected of being collaborative, and each of these samples is attributed to either one or
the other writer. Of course, statistical methods deal in probability, so the resulting diagrams (see Figures 2 and 3 below) show higher or lower probabilities for each author. Here, the samples were 5000 words long; this value is usually seen as safe in terms of statistical significance (see Eder 2015).

This method, although very recent, has already proven its usefulness. The stylometric signals of Joseph Conrad and Ford Maddox Ford have been distinguished in their three collaborative novels (see Rybicki et al. 2014), and the impact of the editor was examined in Jeremiah Curtin’s translations of Polish novels by Sienkiewicz (see Rybicki 2013). Even more recently, and more famously, the impact of Tay Hohoff, the editor of Harper Lee’s *To Kill A Mockingbird*, was studied by comparing that novel to its first version, *Go Set A Watchman* (see Eder and Rybicki 2016; Choiński et al. forthcoming), and made headlines in *The Wall Street Journal* (see Gamerman 2015).

It would not be honest, in this discussion of the methodology applied in this paper, to try to conceal a certain reluctance to equate ‘stylometric’ with ‘stylistic.’ In fact, the authors of this paper are very careful to use only the former term in all references to the quantitative method. While stylometry has its proven successes in telling one author from another, the fact that the differences between them are based on their usage of several hundred very frequent words does not necessarily warrant calling these differences ‘stylistic.’ It is true that the temptation to do so is strong: it is quite natural to look for a text’s content—for ‘what’ a text is saying among its ‘meaningful’ words. Conversely, very frequent words would be more readily associated with ‘how’ a text is written. Discussions on how stylometry and stylistics could be made one have been going on for some time, and early stylometric studies (including many of those quoted above) might have been somewhat overly optimistic. Recently, more cautious stances seem to dominate (see Rybicki and Heydel 2013; Herrmann et al. 2015), and a similar view is adopted here.

4 The Study

The comparative stylometric study we conducted of texts by Edwards and Foxcroft for the purpose of this article can be divided into a few stages, all described in detail below. First, the differences between the authorial signals of the two authors were determined—mainly in order to establish to what extent their styles are indeed stylometrically different. Obviously, the stronger the difference observed, the more reliable the final results. Next, the ‘rolling classify’ method was used in a control experiment to check that the Foxcroft signal does not appear to dominate in texts by Edwards that historically could not have been in any way influenced by the Boston editor. Our aim in conducting this experiment was to show that the study samples were uncontaminated, or in other words, that the two authorial signals were indeed disconnected. We then applied the same method to look for Foxcroft’s signal in those of Edwards’s texts where it was historically possible that they had been altered by the former. Finally, having found strong traces of Foxcroft’s editorship, we sought to identify the potentially contaminated fragments from the published texts.
4.1 The Stylometric Comparison of Edwards and Foxcroft

A general overview of stylometric similarities and differences between the writings of Edwards and Foxcroft is presented in the network diagram in Figure 1. The closer particular elements are situated to one another, the more they resemble another stylistically. In contrast, remote elements remain stylometrically distinct. Figure 1 shows, above all, a considerable separation of the signal of the two preachers, with two highly distinct groupings: one for Jonathan Edwards (black), and the other for Thomas Foxcroft (grey). Notably, Edwards’s theological texts—sermons, treatises, and biblical comments—exhibit a degree of separation in terms of subgenres, and each text type forms an individual cluster as opposed to Foxcroft’s generally more uniform style. This uniformity can be explained by the fact that the texts by Foxcroft that we used in our research were dominated by a single genre: the sermon. It is quite interesting that the spiritual works by Edwards and Foxcroft—when studied in their entirety—represent stylometric outliers in the network; they are separated by the former’s private writings. This is an additional vindication of the quantitative method applied to this material in that it shows a strong divergence between the two authors in how they write: Edwards’s and Foxcroft’s spiritual writings demonstrate visibly different usages of certain words, which should facilitate further analysis.

Figure 1: Network analysis of texts by Edwards (black) and Foxcroft (grey)
4.2 The Rolling Classify Method: The Control Experiment

The results of the stylometric difference experiment meant that we could use the rolling classify method to search in more detail for the editorial signal within potentially co-authored texts. In a first step, texts by Edwards that we had chosen to create the model of his word usage had to be tested against other texts of his. In a second step, we tested them against Foxcroft’s texts—both with the aim of ensuring that their authorial signal undoubtedly belonged to Edwards. This was the control part of the experiment, and we based our selection of texts on the suggested start of their collaboration. Thus, Edwards’s texts in which the presence of Foxcroft’s authorial signal was historically impossible—*The Mind* (1723), *A Faithful Narrative of the Surprising Work of God* (1737), and *Distinguishing Marks of a Work of the Spirit of God* (1741)—were first tested against collections of his sermons from the pre-Foxcroft period and several sermons by Foxcroft; the expected result was that the dominating signal would be that of Edwards.

And this is exactly what happened. The single-axis Figure 2 presents the results of this initial part of the experiment. In each plot, the sole (horizontal) axis represents the course of the text from its beginning (starting at 0) and ending at the last word (the different length of the axes for each of the three

![Comparison of Edwards's and Foxcroft's authorial signals](image)

*Figure 2: Comparison of Edwards’s (black) and Foxcroft’s (grey) authorial signals in the former’s texts before 1745. Numbers on horizontal axes denote locations in texts (in number of words from the beginning).*
texts is a reflection of their differing lengths). The two signals, pre-Foxcroft Edwards (black) and Foxcroft (grey), are placed above the axis, depending on the result of the analysis: the stronger signal is always represented by the band closer to that axis, and the vertical size of the two bands at any location in the texts represents the strength of the two preachers’ signals. In this case, the appearance of grey anywhere in the bottom band—the band closer to the horizontal axis—would suggest that, contrarily to expectations, a Foxcroft signal was present in Edwards’s pre-Foxcroftian texts. As can be seen below, this is not so. It is Edwards’ signal that is invariably the stronger one, both for the 100 (left) and for the 1000 (right) most frequent words. Where the Foxcroftian grey appears, it does so in the upper (less-probable) band of each graph. This shows that, in turn, the three texts by Edwards tested in this part of the study can be safely used for comparison with those from the time of his collaboration with Foxcroft. Here, the stylometric investigation aligns perfectly with historical axioms: there should be no sign of Foxcroft’s authorial fingerprint in such texts as *The Mind* or *A Faithful Narrative*, and indeed no such signal was detected in quantitative analysis.

4.3 The Rolling Classify Method: The Experiment Proper

The application of the same procedure to Edwards’s texts that could have been edited by Foxcroft paints a very different (and much more interesting) picture. Figure 3 shows the relative strength of the two stylometric voices in Edwards’ *An Humble Inquiry Into the Rules of the Word of God* (1749), *The Freedom of the Will* (1754), and *Original Sin* (1758). Here, Foxcroft’s grey signal often penetrates into the lower band of five out of the six graphs. Compared to the control experiment, the grey segments of the upper band are also much bigger, suggesting a balance between the two signals throughout these three texts.

Foxcroft’s editorial trace is particularly visible in *An Humble Inquiry* (top) and *Original Sin* (bottom), irrespective of the selected word list length. This suggests significant editing by Foxcroft of these two texts, both at the lexical level (for such is the significance of the graphs made for the 100 most frequent words) and at a level that includes a higher number of content words (as visible in the graphs made for the 1000 most frequent words). His hand is much less visible in *The Freedom of the Will* (middle left). Foxcroft’s editorial impact is only visible in a single fragment for the 1000 most frequent words; any traces of Foxcroft disappear in the same text for the 100 most frequent words. One could speculate that Foxcroft’s editing of this particular text focused on correcting this single fragment rather than the content of the entire text.
4.4 The Identification of the Contaminated Text Fragments

By comparing these graphs and Edwards’s texts, we were able to locate the fragments of each text that were identified as bearing the definite authorial signal of the editor. Here, the rolling classify method allowed us to pinpoint sections of Edwards’s work that, with a high degree of likelihood, were heavily edited, if not rewritten, by Foxcroft. It needs to be stressed, however, that the exact borderlines for the transition from one authorial signal to another cannot be determined with word-to-word precision. Since Edwards’ stylometric signal changes into Foxcroft’s only gradually (in the course of a few sentences or paragraphs), it is impossible to set the caesura at a specific phrase, clause or even sentence.

The first text put under scrutiny here, *An Humble Inquiry*, was written by Edwards in the spring of 1749. It features a forceful defense of Edwards’s restrictive church policy, which resisted the idea of open church admission favored by his grandfather, Salomon Stoddard. The Northampton minister addresses the arguments of the lenient church thinkers, opposing in particular the doctrine of visible sainthood Stoddard advocated. In *An Humble Inquiry*, there are two segments that show Foxcroft’s distinct authorial signal. Foxcroft’s significance for this text
becomes visible when one looks at the table of contents of the first published version. Edwards decided to include, as an Appendix, a letter from Foxcroft in which his Boston editor summarizes the ecclesiastical views of different groups of English ministers. Understandably, the text that was subjected to analysis here did not contain the letter but only the words that were published under Edwards’s name. The first section of *Humble Inquiry* that can be attributed stylometrically to Foxcroft appears in Part II, beginning with “‘Tis evident, that ’tis not only a visibility of moral sincerity in religion …” (196), and continues until the paragraph that opens with “But the New Testament affords no more foundation for supposing two real and properly distinct covenants of grace, than it does to suppose two sorts of real Christians; the unscripturality of which latter hypothesis I observed before” (206). The second section potentially ‘contaminated’ by Foxcroft occurs in the very same part of the treatise, only a few paragraphs later. It begins with the sentence “The same is manifest by the parable of the ten virgins, Matthew 25” (226) and continues to the very beginning of “Part III: Objection Answered.” Here, too, stylometric evidence suggests that these fragments of the theological argument laid out in the text may be attributed to Foxcroft instead of Edwards—or at least that the former’s corrections are so extensive that they heighten his stylistic signal at the expense of the latter’s. In both sections, Edwards provides corollaries aimed at proving his opening statement of Part II that “none ought to be admitted as members of the visible church of Christ but visible saints and professing saints, or visible and professing Christians” (182). Edwards argues that it is the duty of all Christians to maintain the covenant and ponders on the members’ obligation towards the Church institution. To illustrate his point, he also considers a handful of Biblical “deceiver” saints who were not pious in heart. Edwards’s arguments in both studied passages draw on quotations from the Scripture (cf. 197) and the discussions of the English translation of the Hebrew text (cf. 201-202), all stressing the importance of the covenant for Biblical figures (cf. 204).

When confronted with the correspondence between Edwards and Foxcroft, these numerous traces of Foxcroft may seem surprising. In a letter written shortly before *Humble Inquiry* was to be sent to the printer, Edwards implemented some last-minute changes to part III. He asked his editor to insert one fragment into the text, which Foxcroft did, almost verbatim, with minor alterations in punctuation, one minor stylistic alternation of word order, and one change of past tense to present tense: from Stoddard “often taught his people that assurance was attainable” to “often taught his people that assurance is attainable” (*Letters* 287). These are merely cosmetic changes. The correspondence between Edwards and Foxcroft on *Humble Inquiry* does not explain the strong, consistent presence of the editor’s stylometric signal shown in the rolling classify graphs above. The implication is that, possibly, these changes were either discussed in correspondence not included in Edward’s surviving letters or were unsolicited by the Northampton minister.

In *Freedom of Will*, Edwards’s flagship theological treatise, the fragment that seems to have been extensively modified (or written) by Foxcroft can be found in part II. In “Section 10: Volition Necessarily Connected with the Influence of Motives,” Edwards repudiates the views about determinism advocated by Thomas Chubb, an English lay Deist, whose treatise *A Collection of Tracts on Various*
Subjects (1730) is strongly attacked in Freedom of Will. In spite of his Deistic views, Chubb was a churchgoer and a supporter of rational Christianity, which he argued for in Discourse Concerning Reason (1731). Yet his outlook on human free will could not be reconciled with Edwards's theological doctrines. The contaminated fragment of this section opens with “Now I desire it may be considered, how this can possibly consist with what he says in other places” (236) and continues throughout “Section 11: The Evidence of God’s Certain Foreknowledge of the Volitions of Moral Agents,” up to the point at which Edwards argues that the prophecies of scripture would be devoid of sense if one assumes that God has no “prescience of the future action of moral agents” (248). The fact that the fragment with the strongest trace of Foxcroft’s hand concerns the refutation of the proposals of Thomas Chubb suggests that, in the course of the preparation of the treatise for printing, Foxcroft might have gone so far as to include his own observations regarding the deistic and rationalistic arguments of Chubb, or that (much more probably) he was implementing corrections Edwards sent him in some other communication.

In the correspondence between Edwards and Foxcroft, there is no explanation of this new contamination that points directly to the sections modified by the editor’s hand. In a letter sent from Stockbridge on 6 March 1754, Edwards asked Foxcroft to modify some elements of Freedom of Will before publication and to insert a larger text fragment into “Section 7: Concerning the Notion of Liberty of Will Consisting in Indifference” (Letters 625). However, the exact location of this alteration in the treatise has not been determined. In the rolling classify analysis no change of authorial signal is visible in this part of the text, suggesting that Foxcroft did not in fact modify the fragment included in the letter in any substantial way, and that the addition contains Edwards’s uncontaminated text.

Original Sin (1758), another key theological treatise by Edwards, contains four fragments in which Foxcroft’s stylometric presence is palpable. This late text of Edwards is particularly relevant in the context of a vitriolic debate regarding the nature of the human condition. In Original Sin, Edwards confronts the Enlightenment belief in human perfectibility and potentiality. He obviously believed that the orthodox doctrines of Christianity were being challenged by the growing spirit of rationalism, deism and Arminianism, and Original Sin was his reply to what he saw as the spreading of a falsely optimistic view on the condition of the natural man. The first of the four fragments with Foxcroft’s signal, in part one, begins at the very end of Section 7, with the words: “These things clearly determine the point, concerning the tendency of man’s nature to wickedness” (167) and continues throughout most of Section 8, up to the paragraph closing with: “Thus the Scripture represents the matter (II Kings 17)” (180). In that fragment, Edwards elaborates on human depravity, stressing the imputation of Adam’s first sin to his posterity, and makes copious references to John Taylor’s works which questioned the dogma of human depravity, like The Scripture Doctrine of Original Sin (1740).

The second fragment with a discernible Foxcroft trace can be found in Chapter 1, “Section 2: Concerning the kind of death, threatened to our first parents, if they should eat of the forbidden fruit.” It opens with: “And that temporal death
Jonathan Edwards and Thomas Foxcroft 155

is not meant in these places” (240) and ends with the powerful exclamation: “implying the most horribly unrighteous treatment of millions of perfectly innocent creatures!” (252). The third fragment of Original Sin that exhibits Foxcroft’s fingerprint is in Chapter 3, “Section 2: Observations on Romans 3:9-24.” It begins with the sentence: “That this supposed sense disagrees extremely with the terms and language which the Apostle here makes use of” (287) and closes with: “We American Deists, we foolish blind infidels, etc. This indeed would be very unnatural and absurd” (299), in “Section 3: Observations on Romans 5:6-10, and Ephesians 2:3 with the context, and Romans 7.” The passage includes Edwards’s comments on the relevant passages from the Scripture, as well as the refutation of John Taylor’s interpretation of the inevitably fallen nature of humans.

The last contaminated text segment spans from the beginning of Chapter 4, “Section 4: Remarks on Dr. Taylor’s way of explaining this text,” Paragraph 4: “Tis altogether inconsistent with the Apostle’s scope, and the import of what he says, to suppose that the death which he here speaks of as coming on mankind by Adam’s sin” (311), all the way to the end of the section and the words “Tis a thing that confirms the certainty of the proof of the doctrine of original sin, which this place affords, that the utmost art cannot pervert it to another sense” (348; added emphasis). Again, in this longer fragment, Edwards seeks to undermine Taylor’s views in the context of the doctrine of original sin, which he describes as “absurd” and “unreasonable.” Using numerous references to the New Testament (but no direct quotations), the preacher also explains what he considers an orthodox uptake on “justification” and “righteousness.” Writing to Foxcroft from Stockbridge on 11 February 1757, Edwards informs his friend and editor that he is working on a defense of the doctrine of original sin. Edwards declares that Original Sin will be as voluminous as Freedom of Will and asks Foxcroft to edit the manuscript and read the proofs (cf. 696). In other letters, there is no mention of the changes Foxcroft implemented in the text. Thus, we are left to surmise that the distinct stylometric signals discernible in the published book are remnants of his editorial efforts and that alterations he executed gave the treatise its final shape, or they could be a residue of Foxcroft’s comments on Taylor’s works which Edwards incorporated into his text.

All the fragments we have discussed here form substantial segments of Edwards’s texts. These alterations do not modify Edwards’s general thesis, for his rhetorical skill and talent for meticulous argumentation transcend them. Yet surely, they play an important role in the construction of texts that so far have been studied as uniquely and solely Edwards’s own. From this perspective, it is critical to point out that they are potentially attributable to Edwards’s editor. Of course, this does not necessarily mean that Foxcroft’s changes and implementations were not approved or even encouraged by Edwards. As we emphasized in our discussion, there was a deep sense of trust and intellectual affinity between the two authors. Neither does this analysis discredit Edwards’s texts, or the complexity of his thought. Still, it is a curious and refreshing observation that if someone were to attach particular interpretative significance to a minute word or a turn of phrase in the fragments delineated above, they might have to substitute the name Edwards with Foxcroft.
5 Conclusion

The results presented above have two significant consequences. The first is a quantitative confirmation of the extent of collaboration between two major colonial preachers. The second is that quantitative data agrees so well with qualitative evidence. Both seem relevant from the point of view of the history of religion. Our study shows that such details can be detected in quantitative textual analysis, and that fragments of texts that derive from particular editorial interventions can now be identified. The one serious caveat—the possibility that this method might generate false positives—has been more or less eliminated by pretesting the control sample, as described in the discussion of Figure 2.

These results are also significant from the point of view of stylometric methodology. While earlier studies have shown the feasibility of identifying different hands within a single work rather than the staple of authorship attribution—i.e. identifying the stylometric signal of a single author—our study perhaps constitutes the strongest case to date for the visibility of an editor rather than co-author. While stylistic differences between two authors can be visible to the naked eye of a careful and experienced reader, editorial interventions are usually much less evident. Apparently, that same naked eye might now see more thanks to the lens of quantitative analysis. With the division of this study into several stages, the article also seeks to establish a protocol for the stylometric search for editorial ‘fingerprints’ in published text, in and beyond the eighteenth century.

Yet to continue with the same metaphor, the same naked eye that was aided by a quantitative lens must now return to the text. As we showed, stylometry can point out the general location of editorial interventions and serve as a guide. However, it then needs to be supplemented by detailed, qualitative analysis. Only the combination of quantitative and qualitative readings can help us understand the exact nature of the collaboration between these two great minds of colonial America.

Works Cited


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