Checking Some *Wellesley Index* Attributions by Empirical 'Internal Evidence': The Case of Blackie and Burton[1]

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Abstract: Since its inception, the *Wellesley Index* has been a great resource for scholars wanting to know the identity of the numerous anonymous contributors to the nineteenth-century periodicals. However, when all the available external evidence was exhausted *Wellesley* attributors began to rely on internal evidence, and some of these attributions are now being queried as unduly speculative. This is the case with the attribution of certain articles in *Tait's Edinburgh Magazine* to John Stuart Blackie and John Hill Burton, two Scottish contributors in the 1830s and 40s, where the evidence is, as Eileen Curran noted in *The Curran Index,* often 'tenuous.' Developments in computational stylistics over the last thirty years now offer statistical techniques for testing such doubtful attributions. Use of the Burrows Method, based on an author's relative usage or non-usage of common function words, allows the researcher to isolate an author's distinctive stylistic traits and to use these to compare his known articles with others of more doubtful provenance and to make informed judgments about the likelihood of his authorship of these. These methods were used to test the authorship of eight articles attributed to Blackie and eight attributed to Burton. The use of function words in the doubtful articles was compared to that in six articles reliably attributed to Blackie and ten reliably attributed to Burton and then to that by contemporaries also writing for other major periodicals. It was found that only four of the Blackie articles tested and two of those by Burton appear to have been correctly attributed in the *Wellesley Index*.

1. Introduction

It was once thought that authors' use of the very common words of English showed no patterned variation: any competent user of the English language used them at the same rate, and individuality of style only emerged from less common lexical words. Following in the footsteps of 'function word' pioneers Ellegard and Mosteller and Wallace,[2] John Burrows showed that the incidence of these words varies significantly between texts by different authors while remaining comparatively constant within a single author's work (Burrows, 1987: 1-2). This finding was at the heart of all his early

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[1] A more detailed account of this work can be found in Chapter 8 of Antonia's doctoral thesis "Anonymity, Individuality and Commonality [...]" The thesis can be accessed online via Nova, the University of Newcastle's Digital Repository at http://nova.newcastle.edu.au/

[2] Holmes (1998: 112) concluded that building on Ellegard's work on the "Junius Letters," Mosteller and Wallace provided the first "really convincing demonstration of stylometry's potential" and opened "the way to the modern computerized age of stylometry."

work and led to the development of what is usually known as the "Burrows Method" at the Centre for Literary and Linguistic Computing [CLLC][3] at the University of Newcastle, Australia. By subjecting the most common words of a large set of texts to statistical procedures like Principal Component Analysis Burrows was able to show that rates of usage vary systematically, and that most authors have a characteristic use, sometimes called a "wordprint," of these common words that distinguishes their style from that of their fellows (Burrows 1996, 2004).[4]

One major area in which the Burrows Method has been used is that of the attribution of authorship (Love, 2002: Chap. 8). After many years of experimentation and refinement by Burrows and his colleagues, it has emerged as a particularly useful tool for testing hypotheses devised by the researcher on the basis of fragmentary or ambiguous "external" evidence, or on "internal" evidence of style, tone, or subject matter. Selected texts by known authors (including the putative author) are subjected to statistical analysis of the frequency of the most common words in the expectation that authorial groupings based on the authors' characteristic word usage will emerge, and that if a text of doubtful or contested authorship is placed among these texts, the validity of the attribution can be assessed. The results of such tests are, of course, matters of probability, not of certainty. Factors other than the author's idiosyncratic preferences— for example the text's era, genre, and topic, and the gender, nationality and stance of the author—can determine which common words are used. It is therefore usual, when using this method, to take the precaution of choosing texts for comparison which share most of these characteristics with the text or texts being tested. The authors of the present article have become interested in applying the methods of computational stylistics to the area of anonymous authorship in nineteenth century British periodicals (see Jordan *et al*, 2006), and this article reports on our investigation of a particular case in the hope that the methods we have used may prove helpful to others undertaking the same sort of work.

2. Authorship and Internal Evidence

Hugh Craig has argued that, in spite of the fact that some scholars question the role of authorship "as a key to understanding textuality and as a basis for interpretation and editing," the continuing academic concern with attribution demonstrates that the "older authorship model […] which made authorship the chief guarantor and constituting power

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[3] See the CLLC website at http://www.newcastle.edu.au/school/hss/research/groups/cllc/

[4] Holmes (1998: 114) says that Burrows "achieved remarkable results, indicating that the way in which authors use large sets of common function words […] appears to be distinctive" and that "the Burrows 'method' has now become the standard first port-of-call for attributional problems in stylometry; in a simple sense, it seems to 'work.' In a more recent publication, Holmes and Croft (2010: 186) reiterate this affirmation of the 'Burrows' approach as "the first port-of-call for attributional problems" and adopt it as the initial technique in their investigation.

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of meaning in texts" remains the basis of much academic work. "After two decades or so of work," he continues, "computational stylistics has established a strength and consistency to the author effect in practice that overturns the consensus about the invalidity of that effect in theory" (Craig, 2009-10). Walter Houghton (the founder of the *Wellesley Index* project) argued for the importance of attribution by pointing out that "the context in which one discusses an essay, and therefore its place in a work of scholarship, can depend on knowing the contributor and therefore the group he speaks for." An anonymous paper attacking the Thirty-nine Articles, he suggested, "would mean one thing if it were written by T.H. Huxley and something quite different if the author were the Bishop of London" (Houghton, 1972: 48-51).

In his book *Attributing Authorship*, Harold Love discusses "the problem of unattributed journalism" and suggests that for some authors, particularly minor ones "the determinism of authorship is often crucial" to the mapping out of a career, defining a canon or "establishing whether the person concerned really held particular views." Although conceding that for many texts there may be no sure answer as to "how personal responsibility for given aspects of given texts might be distributed," he points out that there are good practical reasons for crediting authorship to the person who performed it. Further, he suggests, most writers "wish passionately to assert their responsibility for their creations" (Love, 2002: 2-3). These observations are pertinent to a consideration of the notion of authorship of the nineteenth-century periodicals[5].

The nineteenth century literary scene in Britain was notable for the number of serious quarterly and monthly periodicals dealing with political, literary, historical and scientific subjects of the kind that now have their own specialised academic journals. Anonymity in reviewing was an inheritance from the eighteenth century which the major quarterlies adopted without question in the first decades of the nineteenth century. As the century progressed, however, there was a "movement towards signature" which became the norm in the reviewing of the eighties and nineties (Maurer, 1948:10). This issue, and the controversy surrounding it, is intimately connected with the relationship between authorial individuality and editorial responsibility—whether the journal's or the author's name is more important. It is not surprising that the debate concerning anonymity versus signature was so contentious, in view of the nature of the 'hybrid genre' created by the

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[5] One notable example of the public's interest in the authorship of anonymous articles was the *Saturday Review*'s Modern Women series. When a collection of these was published in 1868 under the title *Modern Women and What is Said of Them*, the publisher deliberately withheld authorship information in this tantalizing fashion: "The authorship of these papers has been attributed to different individuals, male and female; but it is more than probable that the writers whose names have been mentioned in this connection are precisely those who have had nothing to do with them (*Modern*, "Advertisement"). Fifteen years later, Eliza Lynn Linton was finally able to claim authorship of ten of these articles including the infamous "Girl of the Period" article. She thanked the authorities of the *Saturday Review* for their permission to republish them under her own name, saying she was "glad to be able at last to assume the full responsibility " for her own work and claiming she had twice been introduced to the author of the "Girl of the Period," one a clergyman, the other a society matron (*Girl* vii-viii).

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Edinburgh Review and adopted by the other journals. Reviews, according to Levine and Madden (1968: viii-ix), are supposed to be dependent "upon the works on which they feed" and are assumed to be at their best when they mediate "truth without calling attention to the author." The runaway success of the *Edinburgh Review*, however, lay in the fact that it was, even from the start, more than a review. It was a review where the bulk of the interest was to come from the so-called reviewer's own input—his or her "large and original views of all the important questions to which these works might relate" (*Wellesley* online introduction). While the authorial contribution had become all-important to the success of the genre, the policy of anonymity worked at merging authorial individuality with the editorial voice and house-style of the journal.

For many years the authors of periodical articles could only be identified if the contributions had been republished by the author as part of a collection of essays. However, as the online guide to the *Wellesley Index* puts it, "the scholarly importance of this material created an imperative to provide indexes through which it could be accessed." During the last eighty years[6] both literary scholars and historians have been constructing such indexes by combing surviving publishers' records and personal memoirs and letters from the period for further information on the authorship of these articles. Between 1966 and 1989 much of the effort was harnessed into producing the multi-volume *Wellesley Index* where the authors of many of the unsigned contributions to forty-three nineteenth-century periodicals have been identified (Colby, 1994:287-8), and this has been a great resource for scholars since its inception.

Nevertheless, doubt has for some time been thrown on the accuracy of some of the *Wellesley* identifications (for example Hall, 1991). In the earlier stages of the *Wellesley* project, when scholars were dealing with periodicals for which substantial editorial archives had been preserved, attributions were restricted to those for which such "external evidence" could be found. When, however, the project moved on to journals for which archival material was scanty the use of "internal evidence" began to be admitted, and scholars began to identify authors from such aspects as subject matter, point of view, and 'style, using what one of the editors described as "the warts, tics and scars" of individuals to differentiate one author's writing from another's (Hiller, 1979). There is growing evidence that some of this use of internal evidence has been rather cavalier.

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[6] In a private communication from Eileen Curran she has explained to us that the attribution of unsigned articles as a scholarly project began in the 1930s when Ashley Thorndike and Emery Neff, professors at Columbia University, encouraged graduate students to make the intensive study of individual periodicals, even of a few years of a periodical's run, their dissertation topics. Many of these students then discovered that adequate understanding of a periodical must involve an attempt to identify the authorship of articles. She cites the following as examples: George Nesbitt, "Benthamite Reviewing: Twelve Years of the Westminster Review, 1824-1836" (1934); Miriam Thrall, "Rebellious Fraser's" (1934); Edwin Everett, "The Party of Humanity: The Fortnightly Review and its Contributors, 1865-1874" (1939); Leslie Marchand, "The Athenaeum. A Mirror of Victorian Culture" (1941); Merle Bevington on The Saturday Review (1941); Francis Mineka, "The Dissidence of Dissent. The Monthly Repository, 1806-1838" (1944).

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Eileen Curran's *The Curran Index: Additions to and Corrections of The Wellesley Index to Victorian Periodicals* contains notes like the following to a number of attributions:

> **Tait's Edinburgh Magazine . . . 431** On a criticism of Niebuhr, 5 o.s. 1 n.s. (April 1834) 188-189. s/ **B.** *Delete* entry, with its attribution to John Stuart Blackie. *Add*: **John Hill Burton, prob.** A year earlier, Burton had contributed #229; see above. The first article that can safely be attributed to Blackie, #803, did not appear until 3 years later and carried no signature. Burton, a historian educated in the classics, contributed a great deal to *Tait's* in the 1830s. [*Wellesley* attributes to Burton 4 later articles signed B.--#s 1804, 1846, 1870, and 1878; and to Blackie 2 others--#s 1522 and 1719. The evidence is often tenuous for these and also for several other articles given to the two men.]

It was Eileen Curran's concern with the possible further misattribution of articles by Blackie and Burton, two Scotsmen with many similar characteristics—born in 1809, educated at Marischal College, Aberdeen, frequent contributors to the periodical press— that prompted us to undertake the project reported on here. Although the commonalities shared by Blackie and Burton created a situation where the usual methods of internal attribution were likely to fail,[7] the ability of computational stylistics to reveal distinctive authorial stylistic patterns would seem to offer a better chance of success in assigning authorship to one or other of these authors.[8] We received from Eileen a list of the articles in *Tait's Edinburgh Magazine* ascribed to Blackie and Burton, and her own notes suggesting that although 94 articles are attributed to one or other of these men between 1833 and 1854, there is good external evidence for the authorship of only 16 of them. We believed that these 16 articles would provide us with a sufficient basis to build characteristic word usage profiles for Blackie and Burton, and that the methods of computational stylistics could be used to test their authorship of the doubtful articles. We have in consequence digitised 13 of the "known" articles (the remaining three were, we felt, too short to be useful) and 16 of the "doubtful," and we feel this has allowed us to reach fairly firm conclusions: of the 16 doubtful articles we tested, four are likely to be by

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[7] See Appendix A for a summary of the Wellesley bases of attribution for the 16 *Tait's* articles under test.

[8] Our work with our corpus of periodical articles has shown that some authors varied their use of common words quite strikingly, depending on whether the article dealt with literary, historical, social or political matter, whether the tone was polemical, expository, descriptive or contemplative, and so on. This rather more conscious aspect of word choice was called "intra-generic focus" in Antonia's dissertation. While the periodicals can be considered instances of a single genre—the essay-like review or the review-like essay— nevertheless, within the genre there seemed to be different ways of tackling the article which allowed the author to adopt the particular approach conventionally considered suitable for that topic and to make use of the set of stylistic words associated with that approach. The most extreme example of this versatility in our corpus is George Henry Lewes with Blackie not far behind him. With others the style is remarkably homogeneous whatever the context, Burton being a good example here. A more detailed account of this sort of mapping can be seen in Chapters 3 and 4 of Antonia's thesis.

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Blackie and two by Burton, and it seems possible that two further, as yet unidentifiable, authors were responsible for seven of the remaining ten doubtful articles.

3. Using the Burrows Method

In using the Burrows Method one first assembles three groups of texts[9], a Test Piece or Pieces, a Base Set, and a Counter Set. In this case we prepared as Test Pieces the sixteen "doubtful" articles ascribed to Blackie or Burton which had been digitised, and two Base Sets of texts reliably attributed to each author. For constructing Counter Sets we had at our disposal a large corpus of 162 digitised reliably-attributed texts (more than one and a half million words) that had been published in major quarterlies and monthlies between 1830 and 1880.[10] One then creates Tables[11] showing the proportional usage of words from a pre-determined list in the texts for all three Sets. We used a list of the 150 most common "function" words derived from our Victorian Periodicals corpus. (See Appendix C). When the texts to be compared have been selected, their tables of numbers are pasted into a comprehensive statistics package like SPSS or MiniTab and measurements of the comparative use of these words conducted.

For the presentation of our findings in this article we have used MiniTab 15 to create Multivariate Cluster Analyses with the results expressed as dendrograms.[12] An increasing number of practitioners of computational stylistics are turning to multivariate analysis as the most suitable technique for the analysis of linguistic variables.[13] Cluster analysis is a useful technique for representing the 'natural groupings, if any, of a set of texts. The main advantage of the method is that its results can be presented in a tree-diagram format, which is easy for the reader to interpret. The samples bearing most resemblance unite earliest, while the most different samples unite last of all. This simplicity of presentation is offset by a lack of transparency as to what underlies the pairings or separations, and the method occasionally produces an unexpected pairing

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[9] All the texts in the Victorian Periodical corpus and the additional *Tait's* texts used in this project were carefully edited to ensure that only the author's words were counted. All quotations and extraneous material were removed from the count.

[10] A complete list of the articles in the Victorian Periodical corpus can be accessed from a link on the CLLC home page website. See http://www.newcastle.edu.au/school/hss/research/groups/cllc/projects.html

[11] At the CLLC we use a program especially designed for this purpose known as Intelligent Archive.

[12] Experience has shown that the choice of 'Squared Euclidean' for distance measure, 'Ward' for linkage method and standardized variables yield the most readily interpreted results.

[13] Part of the reason for the success of multivariate techniques rests on the realisation that the patterns of occurrence and word frequency in language are often systematic. Such systematic effects mean that the variables being tested are to a certain extent inter-dependent, revealing more when they are examined together than when any of them is examined in isolation. See Burrows (1996: 2)

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when some other likeness causes a statistical affinity with a text by another author. Yet, as Hoover (2001: 438) writes, the failure of cluster analysis to produce "completely accurate clusters is hardly a catastrophe" since other methods are available.[14] It is our normal practice, before accepting the validity of an initial cluster analysis, to run further tests where the results are produced in a different format (e.g. as scatter diagrams) to check that the interpretations of the findings are consistent.

4. Wordlist Tests

Our first step was to see whether our Victorian Periodicals wordlist would separate the firmly attributed Blackie and Burton articles on the basis of authorship. To do this we first compared the distribution of the words in our list in the articles by Blackie with the distribution in those by Burton. Figure 1 below[15] shows the two sets of articles dividing on an authorial basis into quite distinct trees, suggesting that there is a significant difference in these authors' usage of the words in our Victorian Periodicals wordlist. Our second step was to see if this distinction was preserved when checked against firmly attributed articles written by contemporaries

Figure 1

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[14] Hoover also writes that "under carefully controlled conditions, however, a cluster analysis of the most frequent words of texts is still a useful first step in determining authorship."
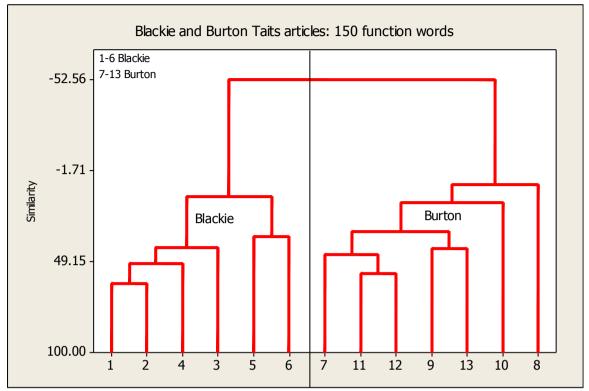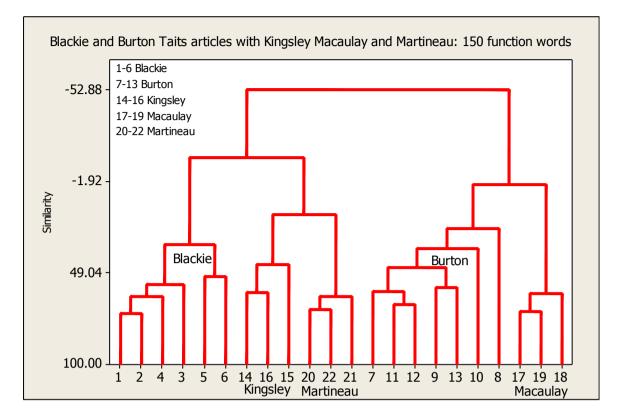
[15] Full bibliographic information for the texts used in the figures included in this article can be found in Appendix B.

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Blackie and Burton Taits articles: 150 function words

Accordingly, we ran a large number of trials comparing the Blackie and Burton articles with different groups of texts from our corpus and found that the texts reliably attributed to each of our Base Set authors almost always grouped together, but were differentiated in varying degrees from those by other authors within the corpus. Figure 2 below shows one such test where the word distribution in the Blackie and Burton articles was compared with the distribution in nine articles by three other authors in our corpus. The tree diagram confirms the *Wellesley Index* attribution of these articles and suggests that Blackie's word usage was similar to that of Kingsley and Martineau, though not as similar as that of these two to each other, whereas Burton's was more similar to that of Macaulay than to that of any of the other three.

Figure 2

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Blackie and Burton Taits articles with Kingsley Macaulay and Martineau: 150 function words

1-6 Blackie
7-13 Burton
14-16 Kingsley
17-19 Macaulay
20-22 Martineau

Having confirmed the reliability of our Victorian Periodicals wordlist for distinguishing Blackie's and Burton's word use from that of their contemporaries, our next step was to run large numbers of tests where we compared the Test Pieces either individually or in a group with a Base Set of articles by the author to whom they were attributed and a Counter Set made up of articles reliably attributed to authors who were unlikely to have written them. If the Test Piece was usually positioned among or close to the articles of the author to whom it was attributed, we felt the attribution could be accepted. On the other hand, if the analyses only occasionally placed a Test Piece among or close to the articles of this author, we concluded that this was probably due to the fact that the word use of the authors in that particular Counter Set was on this occasion even less like that of the author of the Test Piece than that of the Base Set author, and felt the attribution was not necessarily confirmed.

5. The Burton Tests

In the case of the Burton Test Pieces we were able to come to what we felt was a satisfactory conclusion with the use of the 150 Victorian Periodicals wordlist and the Test Pieces combined into a single Test Set. For the Burton Base Set we were able to use not only the reliably attributed texts from *Tait's*, but also some of Burton's contributions to the *Edinburgh Review*. These two Sets were then compared with Counter Sets composed

of texts by pairs of authors chosen randomly from our corpus. The results shown in Figures 3-4 (below) are typical of our findings.
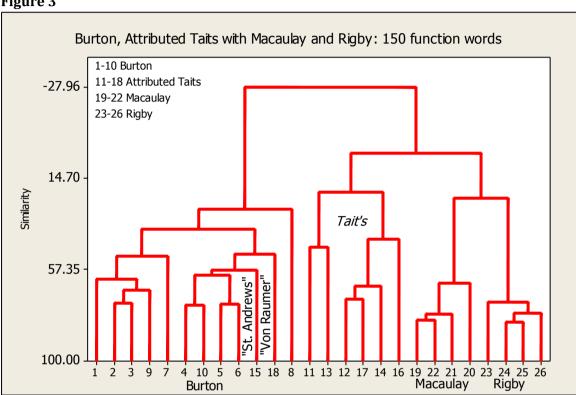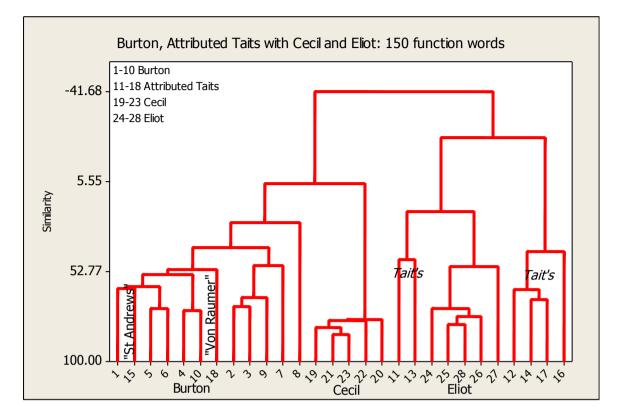
Figure 3

Burton, Attributed Taits with Macaulay and Rigby: 150 function words

1-10 Burton
11-18 Attributed Taits
19-22 Macaulay
23-26 Rigby

Figure 4

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Burton, Attributed Taits with Cecil and Eliot: 150 function words

1-10 Burton
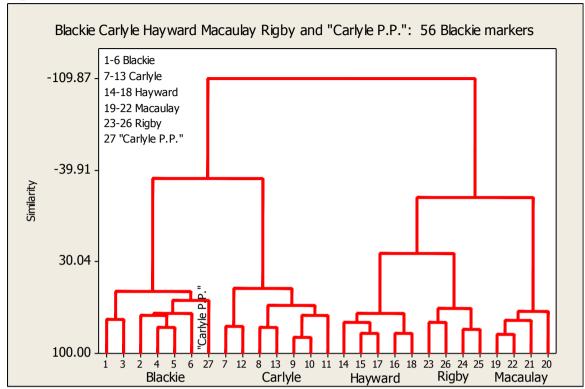11-18 Attributed Taits
19-23 Cecil
24-28 Eliot

In almost all the tests we ran, although six of the articles attributed to Burton showed considerable volatility, sometimes forming a single cluster, sometimes forming trees with the Counter Set authors, two articles, "Von Raumer on the character and times of Charles I" and "*St. Andrews*," regardless of the authors used for the Counter Set, attached themselves to the Burton tree. We therefore feel that there is good reason to believe that these two articles were written by Burton, but that the other six texts in the Test Set that are attributed to him in the *Wellesley Index* probably were not.

6. The Blackie Tests

The Blackie articles required more elaborate testing, since in tests of the type used for Burton not only the Test Pieces but also quite a number of the Blackie Base Set showed a tendency to group with authors used in the various Counter Sets. Our tests revealed that whereas Burton's writing style varied little from text to text, Blackie varied his style according to subject matter or admired models. We therefore employed a method of testing used at the CLLC to give more precise results: the use of a wordlist composed of those "function" words that Blackie used relatively more or relatively less frequently than his contemporaries.
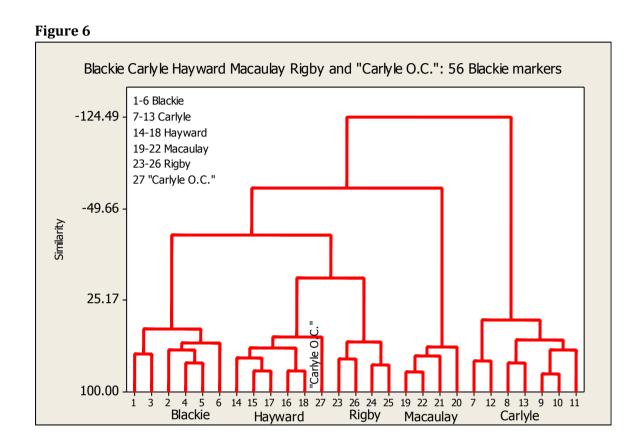
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Figure 5

Blackie Carlyle Hayward Macaulay Rigby and "Carlyle P.P.": 56 Blackie markers

The list was created by running a T-test[16] to compare the proportional usage of the 150 wordlist words in all the reliably attributed Blackie articles with their usage in the articles by the other authors in our Victorian Periodicals corpus. In this test the higher the T-value, the more systematic and marked are the differences between the two sets. We found that the T-tests isolated 56 words (See Appendix D) with a T-test value of +/-2.0 or stronger[17]. We then used these words as "Blackie Markers" in another series of tests. Once again we performed a great many tests using many combinations of the texts in our Counter Sets. We came to the conclusion that in the case of Blackie, it was better to compare the Test Pieces one by one against a range of Counter Sets. Just two of these tests are shown here—one where the Test Piece groups with Blackie (figure 5) and one where it does not (figure 6).

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[16] Distribution testing, such as Student's t-test, estimates whether the difference in mean between two groups of observations means a genuine, consistent difference or reflects a chance effect arising from fluctuating counts. Each t-value has associated with it a probability that the two groups of observations derive from the same parent population and do not differ from each other. Burrows (1992: 97)

[17] For all these words the probability of the null hypothesis, that the two sets in fact belong to a single population, was .054 or less.

Figure 6

Blackie Carlyle Hayward Macaulay Rigby and "Carlyle O.C.": 56 Blackie markers

These tests in combination led us to the conclusion that only half of the articles in our Test Set that are credited to Blackie in the *Wellesley Index*—"National vs. state education," "Carlyle's *Past and Present*," "Styria, and the Styrian Alps," and "The Scottish Universities and the Established Church"—appear to be correctly attributed.

7. Alternative Authors

In our earlier experiments with the 150 Victorian Periodicals wordlist, we had also noticed that several of the articles attributed to Burton, though according to our tests not written by him, nevertheless appeared to share a common author. In several tests Pitcairn's *Criminal Trials*, (July 1833), Tytler's *History of Scotland*, (Dec. 1837), and *The Life and Rebellion of the Duke of Monmouth*, (Jan. 1845) formed a single tree no matter how varied the combinations surrounding them. This suggested to us that the group of articles attributed to Burton might contain works by other individual authors whom it was possible to identify, though not name, using the Burrows Method. Again we performed a series of tests using texts by other authors from our corpus as Counter Sets,

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and in the process a second set of texts that almost invariably formed a single tree emerged.

Figure 7

10 Non-confirmed Taits articles with Bagehot Cobbe and Froude: 150 function words

1-4 Attributed Blackie
1 "Politics New Testament"
2 "Dr Lindsay"
3 "Carlyle's O.C."
4 "de la M. Fouque"
5-10 Attributed Burton
5 "Monastic"
6 "Monmouth"
7 "M'Cullagh"
8 "Pitcairn"
9 "Tytler 1"
10 "Tytler 2"

Figure 8

10 Non-confirmed Taits articles with Kingsley Macaulay and Martineau: 150 function words
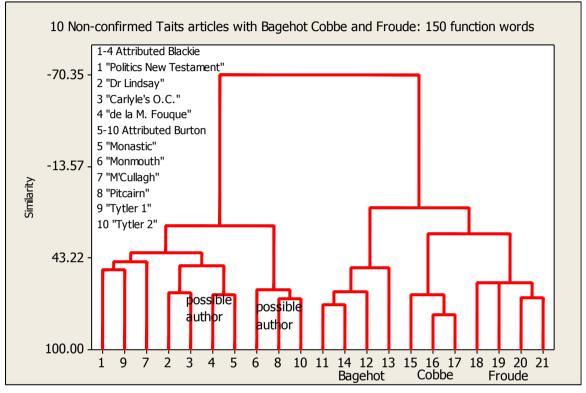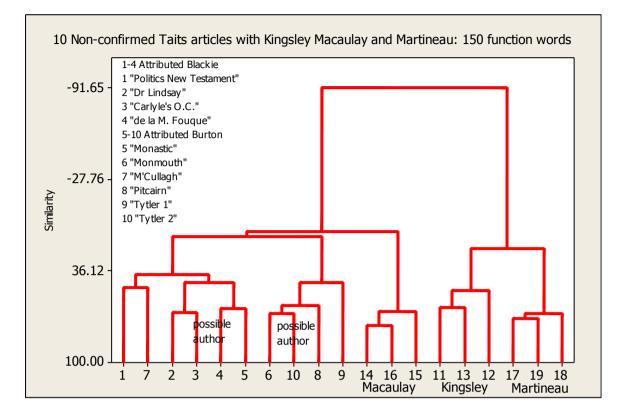
Figures 7 and 8 (above) are examples of the kind of tests run, and it can be seen that as well as the grouping described above, another group of texts, "Mr. Carlyle's *Oliver Cromwell's Letters and Speeches*" (Jan. 1846), "The Work of De La Motte Fouqué" (Aug. 1845), "The Rev. Dr. Lindsay Alexander's *Switzerland and the Swiss Churches*" (Nov. 1846), and "Monastic studies, jests, and eccentricities" (Oct. 1845), emerged as possibly being by a single author.

8. Conclusion

We believe that our analyses have established the following about the sixteen articles whose attribution to Blackie and Burton in the *Wellesley Index* we tested:

1. Half of the articles questionably credited to Blackie, "National versus state education" (Nov. 1837), "Thomas Carlyle's *Past and Present*" (June 1843), "Styria, and the Styrian Alps" (Aug. 1843), and "The Scottish Universities and the Established Church" (June 1845), appear to be correctly attributed.

2. Only two of the articles questionably attributed to Burton, "Von Raumer on the character and times of Charles I" (Feb. 1837) and "*St. Andrews*" (June 1844), appear to have been written by him.

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3. Three of the articles questionably attributed to Blackie in the *Wellesley Index,* "Mr. Carlyle's *Oliver Cromwell's Letters and Speeches*" (Jan. 1846), "The Work of the De La Motte Fouqué" (Aug. 1845), and "The Rev. Dr. Lindsay Alexander's *Switzerland and the Swiss Churches*" (Nov. 1846), and one of those attributed to Burton, "Monastic studies, jests, and eccentricities" (Oct. 1845), appear to be written by a single author who is neither Blackie nor Burton.

4. Three of the articles questionably attributed to Burton, "Pitcairn's *Criminal Trials*," (July 1833), "Tytler's *History of Scotland*," (Dec. 1837), and "*The Life and Rebellion of the Duke of Monmouth*" (Jan. 1845), also appear to be by a single author who is neither Blackie nor Burton.

More generally, we believe that we have shown that their perceptions of "internal evidence" have led some of the scholars who worked on the *Wellesley Index* to make some extremely shaky attributions. While we would certainly not claim that a Burrows Method test, which is itself a form of "internal evidence," can alone generate a reliable attribution, we feel that it can be of considerable use in helping to confirm or challenge claims based on other grounds.

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Appendix A:
Wellesley Index bases of attribution to Blackie and Burton
of 16 articles in *Tait's Edinburgh Magazine* [18]

Attributed to John Stuart Blackie

1. The politics of the New Testament, 15 o.s., 11 n.s. (Dec. 1844), 749-756.
    [*Arguments similar to those Blackie used in another article.*]
2 The Scottish universities, 16 o.s., 12 n.s. (June 1845), 375-379.
    [*Blackie published a book and wrote many articles on the subject.*]
3 The Rev. Dr. Lindsay Alexander's *Switzerland and the Swiss Churches*, 17 o.s., 13 n.s. (Nov. 1846), 729-736.
    [Blackie Prop./ *Article's tone and style that of a Scottish controversialist..*]
4 National versus state education, 8 o.s., 4 n.s. (Nov. 1837), 714-725.

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[18] These descriptions are summaries only and do not contain all the *Wellesley* information. They were created to give an overview of the sort of reasoning behind the attributions.

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[*Blackie refers to an article like this in another article.*]

5 Mr. Carlyle's *Oliver Cromwell's Letters and Speeches*, 17 o.s., 13 n.s. (Jan. 1846), 38-50.
   [*Blackie reviewed a Carlyle work in another article.*]

6 Thomas Carlyle's *Past and Present*, 14 o.s., 10 n.s. (June 1843), 341-348.
   [Signed B. *Blackie used a similar phrase about Carlyle in another article.*]

7 The Work of De La Motte Fouqué, 16 o.s., 12 n.s. (Aug. 1845), 520-530.
   [Blackie? *Writer discusses German literature and uses parentheses.*]

8 Styria, and the Styrian Alps, 14 o.s., 10 n.s. (Aug. 1843), 505-512.
   [*Blackie reviewed a work quoted in this article and had traveled in Styria.*]

Attributed to John Hill Burton

1 Monastic studies, jests, and eccentricities, 16 o.s., 12 n.s. (Oct. 1845), 620-628.
   [*Burton wrote many articles on Church history.*]

2 *The Life and Rebellion of the Duke of Monmouth*, 16 o.s., 12 n.s. (Jan. 1845), 50-60.
   [Burton prob/ *Writer is historian interested in political economy.*]

3 M'Cullagh's *Industrial History of Free Nations*, 17 o.s., 13 n.s. (Oct. 1846), 661-668.
   [Burton prob/ *Many details in article are same as Burton's later book.*]

4 Pitcairn's *Criminal Trials*, 3 (July 1833), 511-525.
   [*Burton reviewed this book for another journal.*]

5 *St. Andrews*, 15 o.s., 11 n.s. (June 1844), 357-364.
   [*Writer of this article mentions his authorship of another (Burton) article.*]

6 Tytler's *History of Scotland*, 5 o.s., 1 n.s. (Sept. 1834), 521-527.
   [Burton prob/ *Writer has a concern for Scottish historiography.*]

7 Tytler's *History of Scotland*, 8 o.s., 4 n.s. (Dec. 1837), 769-780.
   [Burton prob/ *Same reason as above.*]

8 Von Raumer on the character and times of Charles I, 8 o.s., 4 n.s. (Feb. 1837), 73-76.
   [*Writer shows intimate knowledge of Hume, whose life Burton wrote.*]

Appendix B:
Texts Used in Figures 1-8

BASE SET: ATTRIBUTED USING EXTERNAL EVIDENCE:

Blackie, John Stuart from *Tait's Edinburgh Magazine*
   (figures 1 and 2)
1 Rights of the Christian People – apostolic succession – lay patronage – the veto, *Tait's Edinburgh Magazine*, 11 o.s. 7 n.s., (Feb. 1840) 69-84.
2 Protestantism, *Tait's Edinburgh Magazine*, 12 o.s. 8 n.s., (Apr. 1841) 205-214.

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3 Parochial Schools of Scotland, Pt. 1, *Tait's Edinburgh Magazine*, 15 o.s. 11 n.s.,
    (Aug. 1844) 515-521.
4 Parochial Schools of Scotland, Pt. 2, *Tait's Edinburgh Magazine*, 15 o.s. 11 n.s.,
    (Sep. 1844) 565-570. Signed "J.S.B."
5 On the Study of Languages, *Tait's Edinburgh Magazine*, 13 o.s. 9 n.s., (Nov. 1842)
    747-754.
6 Colonel Mitchell's "Fall of Napoleon", *Tait's Edinburgh Magazine*, 16 o.s. 12 n.s.,
    (Jul. 1845) 409-415.

Burton, John Hill from *Tait's Edinburgh Magazine*
    (numbered 7-13 for figures 1 and 2) (renumbered 1-7 for figures 3 and 4)
7/1 Witchcraft in Scotland, *Tait's Edinburgh Magazine*, 7 o.s. 3 n.s., (Jan. 1836) 602-606.
8/2 Statutes at Large, *Tait's Edinburgh Magazine*, 7 o.s. 3 n.s., (Sep. 1836) 17-26.
9/3 The Church of Scotland and Veto Question, *Tait's Edinburgh Magazine*, 11 o.s. 7 n.s.,
    (Mar. 1840) 138-145.
10/4 Prospect of a Poor Law for Scotland, *Tait's Edinburgh Magazine*, 16 o.s. 12 n.s.,
    (May 1845) 323-326.
11/5 Mary Queen of Scotts, Pt. 1, *Tait's Edinburgh Magazine*, 17 o.s. 13 n.s., (Jul. 1846)
    425-482. Signed "B".
12/6 Mary Queen of Scotts, Pt. 2, *Tait's Edinburgh Magazine*, 17 o.s. 11 n.s., (Aug. 1846)
    493-501. Signed "B."
13/7 Celtic Tenures and Highland Clearings, *Tait's Edinburgh Magazine*, 17 o.s. 13 n.s.,
    (Dec. 1846) 493-501.

Burton, John Hill from *Edinburgh Review*
    (figures 3 and 4)

8 Celtic Clearings – free sites – highland passes, *The Edinburgh Review*, 86, (Oct. 1847)
    499-511.
9 The Language and Structure of the Statutes, *The Edinburgh Review,* 84, (Jul. 1846)
    117-146.
10 Robert Pitcairn's "Criminal Trials in Scotland", *The Westminster Review,* 19,
    (Oct. 1833) 332-360.

TEST SET: ATTRIBUTED USING INTERNAL EVIDENCE

Blackie, John Stuart from *Tait's Edinburgh Magazine*

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(two of these used individually in figures 5 and 6)

(used in figures 7-8)

The politics of the New Testament, 15 o.s., 11 n.s. (Dec. 1844), 749-756.

The Scottish universities, 16 o.s., 12 n.s. (June 1845), 375-379.

The Rev. Dr. Lindsay Alexander's *Switzerland and the Swiss Churches*, 17 o.s., 13 n.s. (Nov. 1846), 729-736.

National versus state education, 8 o.s., 4 n.s. (Nov. 1837), 714-725.

Mr. Carlyle's *Oliver Cromwell's Letters and Speeches*, 17 o.s., 13 n.s. (Jan. 1846), 38-50.

Thomas Carlyle's *Past and Present*, 14 o.s., 10 n.s. (June 1843), 341-348.

The Work of De La Motte Fouqué, 16 o.s., 12 n.s. (Aug. 1845), 520-530.

Styria, and the Styrian Alps, 14 o.s., 10 n.s. (Aug. 1843), 505-512.

Burton, John Hill from *Tait's Edinburgh Magazine*

(used in figures 3-4)

(some used with different numbers in figures 7-8)

11 Monastic studies, jests, and eccentricities, 16 o.s., 12 n.s. (Oct. 1845), 620-628.

12 *The Life and Rebellion of the Duke of Monmouth*, 16 o.s., 12 n.s. (Jan. 1845), 50-60.

13 M'Cullagh's *Industrial History of Free Nations*, 17 o.s., 13 n.s. (Oct. 1846), 661-668.

14 Pitcairn's *Criminal Trials*, 3 (July 1833), 511-525

15 *St. Andrews*, 15 o.s., 11 n.s. (June 1844), 357-364.

16 Tytler's *History of Scotland*, 5 o.s., 1 n.s. (Sept. 1834), 521-527.

17 Tytler's *History of Scotland*, 8 o.s., 4 n.s. (Dec. 1837), 769-780.

18 Von Raumer on the character and times of Charles I, 8 o.s., 4 n.s. (Feb. 1837), 73-76.

COUNTER SET: FROM VICTORIAN PERIODICAL CORPUS

(various selections used in figures 2-8)

Bagehot, Walter

Physics and Politics (no. V. concl.) The Age of Discussion *Fortnightly Review* 17 o.s. 11 n.s. (1872), 46-70.

The First Edinburgh Reviewers *National Review,* 1, (1855), 253-284.

On Milton *National Review,* 9, (1859), 150-186.

Physics and Politics (Part III): Nation Making 1 *Fortnightly Review*, 12 o.s., 6 n.s., (1869), 58-72.

Carlyle, Thomas

Characteristics *Edinburgh Review,* 54, (1831), 351-383.

Corn Law Rhymes *Edinburgh Review,* 55, (1832), 338-362.

Memoirs of the Life of Sir Walter Scott *Westminster Review,* 28 o.s., 6 n.s., (1838), 293-345.

Memoirs of Mirabeau *Westminster Review,* 26 o.s., 4 n.s., (1837), 382-439.

Parliamentary History of the French Revolution *Westminster Review,* 27 o.s., 5 n.s., (1837), 233-247.

Signs of the Times *Edinburgh Review,* 49, *(*1829), 439-459.

Taylor's Historic Survey of German Poetry *Edinburgh Review,* 53, *(*1831), 151-180.

Cecil , Lord Robert

The Budget and the Reform Bill *Quarterly Review,* 107, (1860), 514-554.

The House of Commons *Quarterly Review,* 116, (1864), 245-281.

The Change of Ministry *Quarterly Review,* 120, (1866), 259-282.

The Conservative Surrender *Quarterly Review,* 123, (1867), 533-565.

The Programme of the Radicals *Quarterly Review,* 135, (1873), 539-574.

Cobbe, Frances Power

Criminals Idiots Women and Minors *Fraser's Magazine,* 78, (1868), 777-794.

Female Charity - Lay and Monastic *Fraser's Magazine,* 66, (1862), 774-788.

Social Science Congresses, and Women's Part in Them *MacMillan's Magazine,* 5, (1861), 81-94.

Eliot, George

Evangelical Teaching: Dr. Cumming *Westminster Review* 64 o.s., 8 n.s., (1855), 436-462.

German Wit: Heinrich Heine *Westminster Review* 65 o.s., 9 n.s., (1856), 1-33.

The Natural History of German Life *Westminster Review* 66 o.s., 10 n.s., (1856), 51-79.

Westward Ho! and Constance Herbert *Westminster Review* 64 o.s., 8 n.s., (1855), 288-296.

Woman in France: Madame de Sable *Westminster Review* 62 o.s., 6 n.s., (1854), 448-473.

Froude, James Anthony

Arnold's Poems *Westminster Review* 61 o.s., 5 n.s., (1854), 146-159.

The Copyright Commission *Edinburgh Review* 148, (1878), 295-343.

England's Forgotten Worthies *Westminster Review* 58 o.s., 2 n.s., (1852), 32-67.

The Homeric Life *Fraser's Magazine* 44, (1851), 76-92.

Hayward, Abraham

The Advertising System *Edinburgh Review* 77, (1843), 1-43.

Mr. Disraeli: his Character and Career *Edinburgh Review* 97, (1853), 420-461.

Parisian Morals and Manners *Edinburgh Review* 78, (1843), 115-156.

England and France: their customs manners and morality *Quarterly Review* 133, (1872),

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199-241.
Thackeray's Writings *Edinburgh Review* 87, (1848), 46-67.

Kingsley, Charles
Hours with the Mystics *Fraser's Magazine* 54, (1856), 315-328.
The Poetry of Sacred and Legendary Art *Fraser's Magazine* 39, (1849), 283-298.
Thoughts on Shelley and Byron *Fraser's Magazine* 48, (1853), 568-576.

Macaulay, Thomas Babington
Barère's Memoirs *Edinburgh Review* 79, (1844), 275-351.
The Late Lord Holland *Edinburgh Review* 73, (1841), 560-568.
Dumont's Recollections of Mirabeau *Edinburgh Review* 55, (1832), 552-576.
Moore's Life of Byron *Edinburgh Review* 53, (1830), 544-572.

Martineau, Harriet
Nurses Wanted *Cornhill Magazine* 11, (1865), 409-425.
Miss Nightingale's Notes on Nursing *Quarterly Review* 107, 91860), 392-422.
Female Dress in 1857 *Westminster Review* 68 o.s., 12 n.s., (1857), 315-340.

Rigby (Eastlake), Elizabeth
The Two Amperes *Edinburgh Review* 143, (1876), 74-101.
Crowe and Cavalcaselle on the History of Painting *Edinburgh Review* 135, (1872),
     122-149.
Leonardo da Vinci *Edinburgh Review* 141, (1875), 89-126.
Venice Defended *Edinburgh Review* 146, (1877), 165-198.

Appendix C:
150 most commonly used function words in
Victorian Periodicals Corpus

The most frequently used "function" words of the CLLC Victorian Periodicals corpus of 162 digitised texts by twenty authors published in major quarterlies and monthlies between 1830 and 1880 are listed (in frequency order) below.

Words can be classified as "function" words or as "lexical" words. Function words have a grammatical function; there are a limited number of them, new ones being added

only rarely. Lexical words are those like nouns, verbs, adjectives and adverbs which can be substituted for each other in a given position in a sentence. New lexical words are constantly being added to the language.

This use of only "function" words represents a slight departure from Burrows' early work which used the most common words of a corpus, whatever they happened to be. Since the distinction between "function" and "lexical" words is occasionally fuzzy, it has been necessary for us to declare "our" set of function words. This list represents the 150 most common of that set.

the	been	being	does
of	her	us	thus
and	one	might	itself
to	these	many	still
a	has	then	least
in	may	every	among
that	them	did	whose
is	only	shall	yet
it	more	having	whom
as	when	upon	ever
was	our	well	ought
be	will	over	just
with	any	like	always
for	most	you	each
not	what	about	enough
by	she	too	either
but	than	here	between
we	such	where	often
which	him	however	neither
this	would	how	perhaps
have	very	themselves	above
on	some	nothing	anything
his	can	also	within
they	must	even	something
are	its	both	again
he	other	few	why
their	those	under	used
or	should	himself	rather
from	into	through	whatever
at	do	another	off
an	much	though	herself
were	against	cannot	till
all	could	because	ourselves
who	before	while	
so	after	nor	
had	without	never	
no	up	less	
if	same	done	
there	out	down	

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Appendix D:
56 Blackie "Marker" Words

Red = t-test positive scores (Blackie uses relatively more often)
Black= t-test negative scores (Blackie uses relatively less often)

	have	its	you
and	this	she	still
to	on	only	between
a	they	us	here
in	their	these	also
that	her	most	always
it	has	into	whom
as	who	those	each
which	had	do	ever
with	them	should	least
for	were	like	ourselves
his	been	upon	herself
he	what	well	
by	would	under	
was	may	yet	