Goldsmith's Contributions to the *Weekly Magazine*

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Abstract

Fifteen items in the *Weekly Magazine* have been attributed to Goldsmith. Our study uses traditional kinds of internal evidence (mainly verbal parallels) together with evidence from selected linguistic features. A preliminary analysis identifies features which best distinguish Goldsmith samples from those of a number of contemporary authors. Using this selection of features, we calculate the distances of the fifteen *Weekly* items from the cluster of Goldsmith samples; an item at too large a distance is unlikely to be his. A parallel investigation is based on sentence-length statistics. We conclude that seven essays may plausibly be assigned to Goldsmith, that he probably co-authored two pieces, and that in three cases he merely made minor additions to material from other sources.

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1 Introduction

The Weekly Magazine, or Gentleman and Lady's Polite Companion was launched on 29 December 1759; it ran for a mere six numbers. Goldsmith's connection with the journal lay unrecognised until 1935, when Arthur Friedman revealed that two pieces included in Goldsmith's *Essays* of 1765 had first appeared in its pages. The four numbers which Friedman examined in the Huntington Library—at that time the only extant copy—contained other material which, he argued, could be attributed to Goldsmith, in two cases with 'a very high degree of probability' (Friedman, 1935, p. 382). When he published his magisterial edition of the *Collected Works*, Friedman included seven of these essays (though with some hesitations) and acknowledged the possibility that four other essays might be from Goldsmith's hand (Friedman, 1966, iii, pp. 22–56—we refer to this edition as Works). Then in 1986, with the happy discovery of another file of the magazine, containing two further numbers, Roger Lonsdale demonstrated that a third item in *Essays by Mr. Goldsmith* had first appeared in the *Weekly*, and suggested the likelihood that Goldsmith was responsible, as author or translator, for four pieces in the fifth and sixth numbers (Lonsdale, 1986).[1] No other items call for our consideration, apart from one short piece in the final number, to which we shall return.

We have, then, fifteen possible attributions, which we label 'doubtfuls'. We list them in order of publication, with a résumé for those essays not included in *Works*. In quoting from the *Weekly* we have silently emended obvious typographical errors and occasionally modified the punctuation.

d_1 Introduction (pp. i–4). In fact a double introduction. The magazine's editors, a 'Society of Gentlemen', have declined various offers of assistance, including some from yet another 'set of gentlemen' whose rejected introduction they proceed to print. It satirises the hypocrisy of editors who profess every motive for publication except the true one – lining their own pockets (Golden, 1956,

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p. 350), and mocks the usual hotch-potch contents of other magazines by facetiously promising an extraordinarily miscellaneous read.

d_2 'A Description of the Manners and Customs of the Native Irish. In a Letter from an English Gentleman' (pp. 7–13; *Works*, iii, pp. 24–30).

[d_3: this 'ghost' will be accounted for later.]

d_4 'Some Thoughts preliminary to a general Peace' (pp. 15–17; *Works*, iii, pp. 30–34).

d_5 'Some original Memoirs of the late famous Bishop of Cloyne [George Berkeley]' (pp. 17–20, 34–7; *Works*, iii, pp. 34–40). We refer to this as 'Memoirs of Berkeley', and ignore the long quotation on pp. 38–9 of *Works*.

d_6 'The History of Regnard, the French Comic Poet' (pp. 31–4). The adventures of Jean-François Regnard (1655–1709), gambler, lover, prisoner of Algerian pirates, traveller, and comic dramatist.

d_7 'The Life of the Hon. Robert Boyle' (pp. 40–44; *Works*, iii, pp. 40–45). We propose to examine only that portion, approximately half, which is not lifted from *Biographia Britannica*.

d_8 'Improvements and Discoveries that might attend a more extensive Knowledge of remote Countries' (pp. 53–5). A very diverse list of projects: deciphering inscriptions and examining libraries in the Middle East, exploring the interiors of Africa and China, introducing to Europe metallurgical processes, techniques of dyeing, and botanical lore.

d_9 'A sublime Passage in a French Sermon' (pp. 55–7; *Works*, iii, pp. 49–56). We omit the quotation from Massillon and the sentence which introduces it, translated from Voltaire.

d_{10} 'The Futility of Criticism' (pp. 60–61; *Works*, iii, pp. 51–3).

d_{11} 'On the present State of our Theatres' (pp. 61–3; *Works*, iii, pp. 54–6).

d_{12} 'The Modern Taste in Music considered' (pp. 95–7). Praise of Handel and Rameau; criticism of composers who mimic passions instead of raising them, and of performers who show off.

d_{13} [A Letter on Gamesters] (pp. 108–9). The tricks practised by card-sharpers. Young players must be vigilant.

d_{14} 'A Concise History, and Reflections upon Modern Painting' (No.6, pp. 6–11). Brief accounts of German and Flemish artists, from Dürer to Klingster, and from the Van Eycks to Rubens, who receives more extended consideration.

d_{15} 'Some Rules by which a Man may appear learned without being a Scholar' (pp. 13–14). Facetious guidance for the critic. Blind the reader with metaphysical jargon and pseudo-learning, and 'Whenever you talk of yourself, instead of saying *I*, which is egotism to the last degree, say *we* and *us*; men are more apt to reverence the opinions of many than only of one.'

d_{16} 'Theatrical Amusements' (pp. 14–16). Comments on three current productions at Drury Lane.

We shall need to consider the affinities between two of these doubtfuls and two other essays. The *Weekly's* discussion of music (d_{12}) has links with the slightly later 'On the different Schools of Music' in the *British Magazine* (*Works*, iii, pp. 91–3); 'Thoughts on Peace' (d_4) has very close verbal parallels with the final section of 'On Public Rejoicings for Victory', published two months earlier in the *Busy Body* (*Works*, iii, pp. 16–21). Both these ancillary items, being anonymous, are also 'doubtful'; we label them d_{17} and d_{18}, respectively.

Each of the *Weekly's* doubtful essays has some claim to canonical status. Stylometric testing of what we label 'linguistic features'—aspects of vocabulary, grammar and syntax—and of sentence-length may help to bolster (or may perhaps weaken) those claims.

2 Linguistic Features

Our characterisation of Goldsmith's writing habits is based, as in our previous studies, on those essays which appeared anonymously between October 1759 and September 1761, and which reappeared in *Essays by Mr. Goldsmith* (1765, with a second edition in the following year). We have added 'A City Night-Piece', first published in the *Bee* and authenticated by its inclusion in *The Citizen of the World*. This body of text, consisting of 38,112 words, we refer to as the 'corpus'. To avoid distorting our results we next discarded material

closely translated from French sources, together with the parodic 'Specimen of a Magazine' (*Works*, iii, pp. 191–5), and the rules of the 'philosophical club' (*Works*, iii, pp. 15–16). We have used the original, unrevised texts of these genuine essays, in order to compare like with like, since most of the doubtfuls did not have the benefit of revision. We have modernised spelling ('any thing', for example, becomes a single word), and repunctuated, deeming a sentence to be any grammatically self-sufficient unit. We prevent sentences from beginning with '*and*' or '*for*', but oblige them, grammar permitting, to begin with '*but*' or '*yet*'.

The text was then divided into forty consecutive samples each of 750 words. A large battery of tests was directed at the samples, to identify linguistics features which might distinguish Goldsmith's style. Some tests measured easily discernible aspects of his writings: a fondness for *generally*, for *I was resolved*, and for word-patterns. Others—use of triplets, collocations such as '*of* followed by *the*'—drew on the work of pioneers in the attribution field, including Louis T. Milic (1967) and A. Q. Morton (1978). Others still were prompted by conjecture: perhaps the number of occurrences of verbs, adjectives, that-clauses, etc. might prove significant.

We need to be sure that the features we examine are particular to Goldsmith, that they are *his* linguistic preferences and not simply habits shared by contemporary essayists. We have selected for comparison samples of work published between 1753 and 1764: from Hugh Kelly's *Babler* (seven samples) and Arthur Murphy's *Gray's Inn Journal* (six), with five samples from essays by each of the following: Johnson, Joseph Warton, Edward Moore, the Earl of Chesterfield, Richard Owen Cambridge, Horace Walpole, and the Earl of Cork, together with five samples from the *Connoisseur*, the joint production of Bonnell Thornton and George Colman. Kelly and Murphy were compatriots of Goldsmith, with similar backgrounds and interests; we give them fuller representation, since we earlier encountered some difficulty in telling these three writers apart (Dixon and Mannion, 1993, p. 17). The control essays are listed in Appendix B. The same principles of modernising and repunctuating have been applied to both the controls and the doubtfuls.

Inspection of the data led to the immediate discarding of many tests, where for example the Goldsmith scores were too wide in range, encompassing the scores for all the controls. Thirty-five different linguistic features survived, to be subjected to statistical analysis; they are listed in Appendix A. Some tests are concerned with sentence-structure, for example the occurrence of a verb as the penultimate word. Since all the scores for this type of test are expressed as percentages, the small variations in the number of sentences per sample do not affect the results.

Several doubtful essays are long enough to yield two or more 750-word samples. We have in all twenty-five samples, s_r, numbered as follows:

$$s_1, s_2\ (d_1);\ s_3, s_4, s_5\ (d_2);\ s_6, s_7\ (d_4);\ s_8, s_9, s_{10}\ (d_5);$$
$$s_{11}, s_{12}\ (d_6);\ s_{13}, s_{14}\ (d_7);\ s_{15}\ (d_8);\ s_{16}\ (d_9);$$
$$s_{17}\ (d_{10});\ s_{18}\ (d_{11});\ s_{19}\ (d_{12});\ s_{20}\ (d_{13});\ s_{21}\ (d_{15});$$
$$s_{22}\ (d_{16});\ s_{23}\ (d_{17});\ s_{24}, s_{25}\ (d_{18}).$$

The essay on painters (d_{14}) is not susceptible to linguistic tests, since, as Lonsdale has pointed out, it is 'literally translated' from part of the article 'Ecole' in the *Encyclopédie* (Lonsdale, 1986, p. 221).

The assumption throughout is that every word in a sample has come from the pen of its author. We know, however, that eighteenth-century editors and compositors exercised their absolute right to 'improve' submitted articles. The editor of the 'Occasional Prompter' series in the *Daily Journal* certainly did so (Lockwood, 1980, p. 51), and both editor and printer modified at least one of Fielding's contributions to *Common Sense* (Battestin and Battestin 1980, pp. 131–43). Smollett was prepared to tinker with essays published in his *British Magazine* (to which Goldsmith contributed) in order, as he put it, 'to fit them for the public' (Basker, 1988, pp. 190–91).[2] The extent to which our texts were tampered with is an unknown quantity. We can only acknowledge that an assumption of absolute textual integrity is unwarranted.

3 Statistical Analysis

We describe a decision-making procedure based on the statistics derived from observation of elements of style embedded in samples of text, with the aim primarily of identifying those samples that seem *unlikely* to have been written by an author who has previously been proposed. We assume that an author will have preferences, more or less conscious, with regard to the use of certain linguistic features. For example, one author makes frequent use of emphatic words such as *even*, *ever*, *every*, another makes modest use of such words, while a third prefers not to use them at all. The frequency of use of such features constitutes a basis of comparison between authors. When there is uncertainty as to the identity of the author, these frequencies can help to reduce the uncertainty.

Of all the possible linguistic features that an author might employ, perhaps only a small subset have *discriminatory value*, helping to distinguish one author from another. We need to establish which these features are, and to use only these in the analysis.

To provide a general framework for our discussion, we suppose that we have samples of text from the work of m authors that are available for the purpose of feature selection. Let these be: $A_1, \ldots, A_i, \ldots, A_m$. Let n_i be the number of samples of text taken from the work of author A_i, and let $\mathcal{T}_{il}$ denote the *l-th* sample of text of author i, $l = 1, \ldots, n_i$, $i = 1, \ldots, m$. Let there be p linguistic features, $f_1, \ldots, f_j, \ldots, f_p$, which might have discriminatory potential and whose frequency has been observed. Let x_{ilj} be the frequency of f_j in $\mathcal{T}_{il}$. These frequencies are assembled in a data matrix—see Table 1, 2, and 3 in Appendix C. The data matrix for author A_i is:

$$\begin{pmatrix} x_{i11} & \ldots & x_{i1j} & \ldots & x_{i1p} \\ \vdots & & \vdots & & \vdots \\ x_{il1} & \ldots & x_{ilj} & \ldots & x_{ilp} \\ \vdots & & \vdots & & \vdots \\ x_{in_i1} & \ldots & x_{in_ij} & \ldots & x_{in_ip} \end{pmatrix}$$

For $j = 1, \ldots, m$, let

$$n = \sum_{i=1}^{m} n_i;\ \overline{x}_{ij} = \frac{1}{n_i}\sum_{l=1}^{n_i} x_{ilj};\ \overline{x}_j = \frac{1}{n}\sum_{i=1}^{m}\sum_{l=1}^{n_i} x_{ilj};$$

$$SS_W^{(j)} = \sum_{i=1}^{m}\sum_{l=1}^{n_i}(x_{ilj} - \overline{x}_{ij})^2;\ MS_W^{(j)} = \frac{SS_W^{(j)}}{n-m};$$

$$SS_B^{(j)} = \sum_{i=1}^{m} n_i(\overline{x}_{ij} - \overline{x}_j)^2;\ MS_B^{(j)} = \frac{SS_B^{(j)}}{m-1};$$

$SS_W^{(j)}$ is the within groups (authors) sum of squares, and $SS_B^{(j)}$ is the between groups sum of squares. $MS_W^{(j)}$ is the within groups mean square, and $MS_B^{(j)}$ is the between groups mean square. F_j is the ratio of the mean squares (the variance ratio):

$$F_j = \frac{MS_B^{(j)}}{MS_W^{(j)}}.$$

F_j is Fisher's F-statistic in the context of one-way analysis of variance. A relatively small value of F_j entails within group means $\overline{x}_{ij}$ not very different between themselves, indicating authors not very different between themselves. A relatively large value of F_j indicates differences between the authors. Since we know that the authors are different, a small value of F_j suggests that feature f_j is not effective in detecting differences between authors—a large value indicates that it is effective. Thus we can use F_j as a measure of the sensitivity of f_j in detecting differences between authors. For a collection of features, those for which F_j is large will be the better discriminators. To decide what is large and what is small we need to invoke the standard set of assumptions as follows. For a given feature f_j, we suppose that the x_{ilj} are independent and $x_{ilj} \sim N(\mu_i, \sigma^2)$, $l = 1, \ldots, n_i$, $i = 1, \ldots, m$, where $N(\mu, \sigma^2)$ denotes the normal distribution with mean μ and variance σ^2, and where $x \sim D$ is shorthand for: x is a value drawn from the probability distribution D. A large F-value is evidence against the hypothesis H_0: $\mu_1 = \mu_2 = \ldots = \mu_m$. Let $F(m-1, n-m)$ denote Fisher's F-distribution on $(m-1, n-m)$ degrees of freedom. Let P, $0 < P < 1$, be small (say less than 0.1). If $X \sim F(m-1, n-m)$ and c is such that $Pr[X > c] = P$, then an F-value greater than c is evidence against H_0. Accordingly, we *exclude* from

the study those features f_j with $F_j < c$, and *include those* f_j with $F_j > c$. Let $\mathcal{B}^*$ be the collection of *included* features.

In this study we have:

$$n_1 = 40;\ n_2 = 5;\ n_3 = 5;\ n_4 = 6;\ n_5 = 5;$$
$$n_6 = 5;\ n_7 = 5;\ n_8 = 5;\ n_9 = 5;\ n_{10} = 5;\ n_{11} = 7.$$

So that $m = 11$, $n = 93$, $c = 1.94822\ldots$. If $X \sim F(10, 82)$, the value $c = 1.94822$ gives $Pr[X > c] = 0.05$. The F-values for the 35 features are:

$$F_1 = 3.10;\ F_2 = 8.92;\ F_3 = 3.20;\ F_4 = 1.60;$$
$$F_5 = 1.77;\ F_6 = 2.55;\ F_7 = 1.20;\ F_8 = 1.32;$$
$$F_9 = 2.46;\ F_{10} = 1.03;\ F_{11} = 3.38;\ F_{12} = 4.62;$$
$$F_{13} = 5.87;\ F_{14} = 1.84;\ F_{15} = 3.22;\ F_{16} = 2.38;$$
$$F_{17} = 4.54;\ F_{18} = 5.76;\ F_{19} = 1.36;\ F_{20} = 6.19;$$
$$F_{21} = 8.81;\ F_{22} = 1.79;\ F_{23} = 4.09;\ F_{24} = 2.46;$$
$$F_{25} = 6.02;\ F_{26} = 3.60;\ F_{27} = 3.70;\ F_{28} = 9.89;$$
$$F_{29} = 0.88;\ F_{30} = 3.51;\ F_{31} = 2.87;\ F_{32} = 2.91;$$
$$F_{33} = 0.90;\ F_{34} = 2.54;\ F_{35} = 1.60,$$

and we see that 24 of the 35 features have F-values greater than 1.94822. Thus

$$\mathcal{B}^* = \{f_1, f_2, f_3, f_6, f_9, f_{11}, f_{12}, f_{13}, f_{15}, f_{16}, f_{17}, f_{18}, f_{20}, f_{21}, f_{23}, f_{24}, f_{25}, f_{26}, f_{27}, f_{28}, f_{30}, f_{31}, f_{32}, f_{34}\}.$$

Ranked in order of decreasing F-values, these are:

$$f_{28} \succ f_2 \succ f_{21} \succ f_{20} \succ f_{25} \succ f_{13} \succ f_{18} \succ f_{12} \succ f_{17} \succ f_{23} \succ f_{27} \succ f_{26} \succ f_{30} \succ f_{11} \succ f_{15} \succ f_3 \succ f_1 \succ f_{32} \succ f_{31} \succ f_6 \succ f_{34} \succ f_9 \succ f_{24} \succ f_{16}$$

It has been suggested that Goldsmith was the author of a number of *Weekly Magazine* essays. We have 25 samples, $s_1, \ldots, s_{25}$, derived from the eighteen doubtfuls, $d_1, \ldots, d_{18}$, listed above. We identify Goldsmith with author A_1, and calculate a distance of s_r from the Goldsmith samples:

$$\boldsymbol{Z} = \begin{pmatrix} z_{111} & \ldots & z_{11j} & \ldots & z_{11q} \\ \vdots & & \vdots & & \vdots \\ z_{1l1} & \ldots & z_{1lj} & \ldots & z_{1lq} \\ \vdots & & \vdots & & \vdots \\ z_{1n_1 1} & \ldots & z_{1n_1 j} & \ldots & z_{1n_1 q} \end{pmatrix},$$

where $n_1 = 40$, and z's rather than x's because we are now using only the data from the $q = 24$ selected features. Let $\boldsymbol{z}_r = (z_{r1}, \ldots, z_{rq})'$ be the scores of sample s_r. The distance we use for the distance of s_r from the Goldsmith samples is the Mahalanobis distance, D_r^2, of $\boldsymbol{z}_r$ from $\bar{\boldsymbol{z}}$, the centre of the Goldsmith data:

$$D_r^2 = (\bar{\boldsymbol{z}} - \boldsymbol{z}_r)' \boldsymbol{W}^{-1} (\bar{\boldsymbol{z}} - \boldsymbol{z}_r),$$

where $\boldsymbol{W} = (w_{jk})$ is the covariance matrix of $\boldsymbol{Z}$:

$$w_{jk} = \frac{1}{n_1 - 1} \sum_{l=1}^{n_1} (z_{lj} - \bar{z}_j)(z_{lk} - \bar{z}_k).$$

Let H_0 be the hypothesis: Goldsmith is the author of s_r. Then, if H_0 is true, the probability distribution of

$$F_r = \frac{n_1(n_1 - q)}{(n_1^2 - 1)q} D_r^2$$

is $F(q, n_1 - q)$, Fisher's F-distribution on $(q, n_1 - q)$ degrees of freedom. If $X \sim F(24, 16)$, and c is such that $Pr[X > c] = 0.05$, then $c = 2.235$. Thus, at the 5 % level of significance, a distance $D_r^2 > 134$ is evidence against H_0. The P-value is the probability that X is greater than D^2, so a P-value less than 0.05 is evidence against H_0.

The distances and P-values (in brackets) for the samples are as follows:

$$D_1^2 = 85.89\ (0.23);\ D_2^2 = 110.92\ (0.10);$$
$$D_3^2 = 101.84\ (0.14);\ D_4^2 = 192.68\ (0.01);$$
$$D_5^2 = 72.28\ (0.36);\ D_6^2 = 202.95\ (0.01);$$
$$D_7^2 = 279.67\ (0.00);\ D_8^2 = 94.70\ (0.17);$$
$$D_9^2 = 87.49\ (0.22);\ D_{10}^2 = 71.29\ (0.37);$$
$$D_{11}^2 = 40.90\ (0.81);\ D_{12}^2 = 106.14\ (0.12);$$
$$D_{13}^2 = 86.29\ (0.23);\ D_{14}^2 = 113.27\ (0.10);$$
$$D_{15}^2 = 74.74\ (0.33);\ D_{16}^2 = 96.06\ (0.17);$$
$$D_{17}^2 = 46.17\ (0.73);\ D_{18}^2 = 53.56\ (0.61);$$
$$D_{19}^2 = 176.73\ (0.01);\ D_{20}^2 = 224.97\ (0.00);$$
$$D_{21}^2 = 93.48\ (0.18);\ D_{22}^2 = 85.14\ (0.24);$$
$$D_{23}^2 = 149.34\ (0.03);\ D_{24}^2 = 91.56\ (0.19);$$
$$D_{25}^2 = 55.94\ (0.57).$$

So we consider the samples s_4 (d_2); s_6, s_7 (d_4); s_{19} (d_{12}); s_{20} (d_{13}); s_{23} (d_{17}) not to be from the hand of Goldsmith.

The above assessment of the discriminatory effectiveness of a feature f_j has been calculated without regard to its possible interaction with other features. In view of the multivariate character of the data, however, a better approach would be, for a given value of q, $q = 1, \ldots, 35$, to identify those q features which *collectively* have the best discriminatory value. This allows the inclusion of a feature which in isolation has a low F-value, but when used in conjunction with other features has good discriminatory value. Thus, we should measure the discriminatory value of a subset of q features, $\{f_{j_1}, \ldots, f_{j_q}\}$ and choose the subset, $\mathcal{B}_q = \{f_{j_1^*}, \ldots, f_{j_q^*}\}$, which has the best discriminatory value. In this regard, a useful reference for discriminant analysis and variable selection is Krzanowski and Marriott, 1995. Let $\boldsymbol{y}_{il} = (x_{ilj_1}, \ldots, x_{iij_p})'$, where $\{j_1, \ldots, j_q\}, 1 \le j_1 \le \ldots \le j_q \le p$, is a subset of $\{1, \ldots, p\}$. Let $\boldsymbol{j} = (j_1, \ldots, j_q)'$. $\boldsymbol{B}_q(\boldsymbol{j})$ and $\boldsymbol{W}_q(\boldsymbol{j})$ are the between-group and within-group mean square $q \times q$ symmetric matrices, respectively:

$$\boldsymbol{B}_q(\boldsymbol{j}) = \frac{1}{n-m}\sum_{i=1}^{m}\sum_{l=1}^{n_i}(\overline{\boldsymbol{y}}_i - \overline{\boldsymbol{y}})(\overline{\boldsymbol{y}}_i - \overline{\boldsymbol{y}})'$$

$$\boldsymbol{W}_q(\boldsymbol{j}) = \frac{1}{n-m}\sum_{i=1}^{m}\sum_{l=1}^{n_i}(\boldsymbol{y}_{il} - \overline{\boldsymbol{y}}_i)(\boldsymbol{y}_{il} - \overline{\boldsymbol{y}}_i)'$$

where

$$\overline{\boldsymbol{y}}_i = \frac{1}{n_i}\sum_{l=1}^{n_i}\boldsymbol{y}_{il}; \overline{\boldsymbol{y}} = \frac{1}{n}\sum_{i=1}^{m}\sum_{l=1}^{n_i}\boldsymbol{y}_{il},$$

For a given fixed q, we choose the q features that maximize the between-group/within-group mean squares ratio. Thus

$$\{f_{j_1^*}, \ldots, f_{j_q^*}\},$$

is the set of q features where $\boldsymbol{j}_q^* = (j_1^*, \ldots, j_q^*)'$ is the value of $\boldsymbol{j}$ that maximizes

$$\frac{|\boldsymbol{B}_q(\boldsymbol{j})|}{|\boldsymbol{W}_q(\boldsymbol{j})|},$$

where $|\boldsymbol{M}|$ denotes the determinant of matrix $\boldsymbol{M}$.

We score the features according to the number of times they appear in the best set of q features, $\mathcal{B}_q$, $q = 1, \ldots, 35$, as follows: $N_{jq} = 1$, if $f_j \in \mathcal{B}_q$, $= 0$, otherwise. The score for f_j is $N_j = \sum_{q=1}^{35} N_{jq}$. Referring to Table 4, Appendix C, and ranking the features with respect to their scores we get:

$$f_2 \succ f_{21} \succ f_{23} \succ f_{26} \succ f_{18} \succ f_{25} \succ f_6 \succ f_9 \succ f_{11} \succ f_{13} \succ f_{15} \succ f_{28} \succ f_{30} \succ f_1 \succ f_5 \succ f_{20} \succ f_4 \succ f_{31} \succ f_3 \succ f_{12} \succ f_{24} \succ f_{14} \succ f_{34} \succ f_{19} \succ f_7 \succ f_{32} \succ f_{22} \succ f_{33} \succ f_{35} \succ f_8 \succ f_{17} \succ f_{16} \succ f_{27} \succ f_{29} \succ f_{10}.$$

Thus, for example, f_2 and f_{21}, both with scores of 34, are the two most discriminatory features, and f_{10} is the least discriminatory, with a score of 1. The rank correlation, 0.6532, between this ranking and the ranking obtained where the features are assessed independently of each other is, reassuringly, quite large.

The distances of the doubtfuls from the centre of the Goldsmith cluster depend on q. We measure the P-value for each doubtful for each value of q, and count the number of times the P-value is less than 0.1. We view a doubtful sample as unlikely to have been written by Goldsmith if the count is large. Thus, referring to Table 5, Appendix C, we regard each of the following as unlikely Goldsmith candidates: s_6 (d_4); s_7 (d_4); s_{19} (d_{12}); s_{20} (d_{13}). We also regard s_9 (d_5); s_{14} (d_7); s_{23} (d_{17}) as having weak claims to be by Goldsmith.

4 Sentence-length

In a previous study we concluded that in terms of sentence-length Goldsmith's essays were remarkably consistent. Furthermore, measures of sentence-length derived from sixteen of his genuine essays set Goldsmith well apart from his contemporaries (represented by a total of fifty essays, listed in Appendix B), with the exception of three of Johnson's *Idlers* (Mannion and Dixon, 2004). On this basis we can proceed to a direct comparison of the Goldsmith scores, as established in that study, with those of the doubtfuls. Previously we used both correspondence analysis and the

χ^2 goodness-of-fit test. Here we use only the latter—it allows a precise measure of significance. 'Modern Painting' (d_{14}) is a special case: eighty-one of its 103 sentences correspond exactly to those of its source, but the translator has sometimes split a long French sentence into two, has in one place combined two of the original sentences, and in another has made a substantial addition to the text. We thus have twenty-two sentences—a modest total, yielding modest evidence—whose lengths have been determined by the translator, and to which we can apply our test (different from our previous study, here we employ only the χ^2 measure).

We group the sentences of a particular essay, $\mathcal{E}$, according to their lengths. The first group, (0,9], contains those sentences of lengths less than ten. The second group, (9,13], contains those sentences of lengths more than nine and less than fourteen. And so on, the remaining groups being (13,17], (17,20], (20,24], (24,29], (29,36], (36,∞)—making a total of eight groups. Let m_k be the number of sentences in $\mathcal{E}$ in the k-th group, $k = 1, \ldots, 8$. We compare the sentence-length profile of each doubtful essay with that of the sixteen Goldsmith essays combined into a single text $\mathcal{G}$.

In the case $\mathcal{E} = \mathcal{G}$, we find $m_1 = 162$, $m_2 = 158$, $m_3 = 174$, $m_4 = 153$, $m_5 = 153$, $m_6 = 177$, $m_7 = 152$, $m_8 = 164$. The boundary values for the groups—9, 13, 17, 20, 24, 29, 36—were chosen so that $N = 1293$ sentences of $\mathcal{G}$ are shared in approximately equal numbers among the eight groups. $f_k = \frac{m_k}{N}$ is the proportion of sentences in the k-th group: $f_1 = 0.125$, $f_2 = 0.122$, $f_3 = 0.135$, $f_4 = 0.118$, $f_5 = 0.118$, $f_6 = 0.137$, $f_7 = 0.118$, $f_8 = 0.127$ (3 d.p.). We then compute the χ^2 goodness-of-fit measure for $\mathcal{E}$:

$$\chi^2(\mathcal{E}) = \sum_{k=1}^{8} \frac{(m_k - mf_k)^2}{mf_k},$$

where $m = m_1 + \ldots + m_8$ is the total number of sentences in $\mathcal{E}$. The P-value for $\mathcal{E}$ is $P(\mathcal{E}) = Pr[Z > \chi^2(\mathcal{E})]$, where Z is a χ^2 random variable on seven degrees of freedom. A small value of $P(\mathcal{E})$ (less than 0.05, say) suggests that Goldsmith was unlikely to have been the author of $\mathcal{E}$. We find:

$$P(d_1) = 0.272,\ P(d_2) = 0.002,\ P(d_4) = 0.764,$$
$$P(d_5) = 0.046,\ P(d_6) = 0.106,\ P(d_7) = 0.229,$$
$$P(d_8) = 0.017,\ P(d_9) = 0.371,\ P(d_{10}) = 0.365,$$
$$P(d_{11}) = 0.610,\ P(d_{12}) = 0.086,\ P(d_{13}) = 0.000,$$
$$P(d_{14}) = 0.077,\ P(d_{15}) = 0.910,\ P(d_{16}) = 0.438,$$
$$P(d_{17}) = 0.476,\ P(d_{18}) = 0.280.$$

So d_2, d_5, d_8, d_{13} are unlikely to have been written by Goldsmith. We might add to these d_{12} and d_{14}, both with relatively small P-values.

5 Assessing the Evidence

We have identified seven samples from the *Weekly* as unlikely to have come from Goldsmith's hand, on the evidence of their scores for linguistic features, and six essays as suspect on grounds of sentence-length (two less so than the others). We believe that these adverse results deserve to carry weight; whoever is responsible for these texts is not writing in Goldsmith's manner, as represented by his acknowledged essays. For the remaining material, we prefer to say that it has produced 'favourable' rather than 'positive' scores. Nothing in the stylistic profile of these samples militates against Goldsmith's authorship. But there always remains the possibility that the writing could be the work of some unidentified author who happened to have similar linguistic habits. We are therefore never entitled to go further than 'It is very probable that this piece could have been written by Goldsmith.'

In any case, stylometric results provide only one kind of evidence. We need to consider everything that bears on the question of attribution, including:

5.1 Parallels of thought and expression

'All [Goldsmith's] productions are in some degree echoes of each other': Leigh Hunt's judgement may be thought a little harsh (Rousseau, 1974, p. 316). But Goldsmith's habit of borrowing from himself is something the attributionist has reason to be grateful for. Almost all the many parallels between

Goldsmith and the doubtfuls which are cited by Crane (1927), Friedman (1935), and Golden (1956) satisfy the criterion laid down by E.H.C.Oliphant: 'The only true parallel is one that duplicates both thought and the expression of the thought' (Oliphant, 1929, p. 1). We are able to add a few further parallels, which we trust also satisfy that criterion, and heed Oliphant's additional cautions: it is 'useless' to quote 'phrases common to the speech of the time or thoughts that were common property'; parallels may be the result of the 'unconscious repetition' of another author, or of 'haphazard coincidence', or of plain theft (Oliphant, 1929, p. 14). The matter of theft is especially relevant. Goldsmith was never scrupulous about annexing other people's words, so that a parallel between a doubtful and a later Goldsmith text may be a matter of plagiarism rather than self-plagiarism. As a contributor to the *Weekly* he may be presumed to have looked through items other than his own. It follows that a parallel from a review in the *Monthly* or *Critical*, from *Polite Learning* or the *Bee*, all of which antedate the *Weekly*, must be accorded greater weight than one from *The Citizen of the World*.

5.2 Visible markers of style

Stylometric testing has very justly been compared to the use of aerial photography, enabling 'patterns to be detected which are obscured when one is too close to the ground' (Kenny, 1986, p. 116). But even at ground level an irregularity in the surface of a doubtful text is occasionally noticeable, some unusual stylistic feature, perhaps a preference for a certain syntactical structure, which distinguishes its author from Goldsmith (Such a feature does not appear among the thirty-five tests, since those were used to discriminate Goldsmith from the controls, without any reference, at that stage, to the doubtfuls). Or a doubtful text may exhibit fondness for a word or phrase which Goldsmith uses sparingly, or for which he has a preferred alternative. A word employed in a sense which is foreign to the corpus may also deserve consideration.

On one occasion Goldsmith himself used the 'argument from quality', specifically to trounce those who attributed to Edward Young an impromptu epigram on Voltaire, but also to offer a caution to attributionists: 'I only mention this to shew what trifles are generally ascribed to men when once grown famous. The wretchedness of the epigram will readily convince those who have any pretensions to taste, that Dr. Young could never have been the author: probably some blockhead made the verses first, and the story after' (*Works*, iii, p. 253). Nevertheless this kind of negative argument is of little help in the present investigation, since we are considering pieces which, in at least some cases, may have been rushed into print. We side, therefore, rather with Johnson than Goldsmith: to those who questioned the authenticity of the three parts of Shakespeare's *Henry VI* Johnson replied: 'From mere inferiority nothing can be inferred; in the productions of wit there will be inequality. Sometimes judgment will err, and sometimes the matter itself will defeat the artist' (Johnson, 1968, p. 611).

Finally, some evidence is perversely capable of facing both ways. Three essays from the *Weekly* were reprinted in the *Lady's Magazine*, between December 1760 and October 1761, when it is generally agreed that Goldsmith was that magazine's editor (Crane, 1927, p. xxxii). The first to appear was the authentic 'Some Remarks on the modern Manner of Preaching', later included in the 1765 *Essays*. It was followed by 'The History of Regnard' (d_6), and 'Thoughts on Peace' (d_4). Does the reprinting afford a presumption of authorship? Or was Goldsmith following the established custom of appropriating material, without acknowledgement, from an earlier periodical, as he had done in the later numbers of the *Bee*? That the 'Thoughts on Peace' are updated (the political situation having changed) and furnished with an introductory paragraph may represent an author remodelling his own handiwork. Or it may be a case of resetting a stolen jewel.

6 Bringing the Evidence to Bear

It is impracticable to quote here all the relevant parallels; we shall simply refer to the articles and

editions in which they can be found. Since Friedman did not include in *Works* all the parallels which he had identified in his 1935 article, we normally cite the latter, and cite it as 'Friedman' *tout court*. Likewise 'Golden' stands for his 1956 contribution to *Notes and Queries*.

6.1 'Introduction' (d_1)

There is considerable evidence in favour of Goldsmith's authorship:

(i) We can add a further parallel to those noted by Friedman and Golden: 'we have weighed fame in the balance . . .; an alderman, with forty thousand pounds in his pocket has some reason to laugh; a wit, without sixpence . . . should go weep; turtle against Tully, ye exhilerating powers, for all the world to nothing' (p. iii; an alderman's delight in a turtle-feast was something of a cliché, as at *Works*, iii, p. 102.17,173.11). A sentence in *The Citizen of the World* uses the same antithesis: a poor author 'finds, that having fed upon turtle is a more ready way to fame than having digested Tully' (*Works*, ii, p. 238).

(ii) The list of the *Weekly's* staff writers includes 'dirty-shirted authors'; persons who wear dirty shirts are not uncommon in Goldsmith (e.g. *Works*, i, p. 362; ii, pp. 125, 218, 228; iii, p. 295).

(iii) The later 'Specimen of a Magazine' (*Works*, iii, pp. 191–5) also has the unusual word 'magaziner' (a writer of magazine articles). Its contents, too, are gaily miscellaneous, and it too purports to have been written by a 'Society of Gentlemen', thus poking mild fun, as the *Weekly* is doing, at more august journals—the *Critical Review* and the *Royal Magazine*, for example—which brandish the phrase on their title-pages (*Works*, iii, p. 188.16).

In terms of linguistic features and sentence-length this item has the attributes of a Goldsmith essay.

It could well be that Goldsmith was the principal if not the sole author of this high-spirited piece, with perhaps some input from other members of the 'Society of Gentlemen'.

6.2 'A Description of the Manners and Customs of the Native Irish' (d_2)

Morris Golden argued that the paragraphs which introduce the 'Letter from an English Gentleman' and the concluding paragraph of the letter itself 'show distinct traces of Goldsmith's manner', while the remainder is 'undistinguished and matter-of-fact'. We first divided the piece in two, with 'd_3' accommodating all Golden's inauthentic material. But it was clearly preferable to assess his argument once we had looked at the essay as a whole—hence the disappearance of d_3.

It is true that the few verbal parallels are found at the beginning and end of the essay. In addition to the two given by Friedman we may compare: 'here [at one of their festivals] they may be literally said to dance for their bread' (p. 12; *Works*, iii, p. 29) with the statement that Caravaggio 'was driven from city to city in the utmost indigence, and might truly be said to paint for his bread' (*Bee*, *Works*, i, pp. 453–4).

The measures of sentence-length place this piece well outside the Goldsmith essays, while the middle section (s_4) is unlike Goldsmith in its linguistic features. Golden's argument seems therefore very plausible: Goldsmith was using the same 'framing' technique that he had employed in the *Bee* (e.g. *Works*, i, pp. 370–72 and 483–6), adding introductory and concluding matter to someone else's work, whether already published, as in the *Bee*, or newly submitted for publication, which may be the case here. Goldsmith was perhaps responsible for all the introductory paragraphs. The remaining points at which his hand is discernible—the last sentence of the antepenultimate paragraph, and the final sentence—are precisely those places where someone preparing an MS contribution for the press might intervene to 'improve' the text.

6.3 'Some thoughts preliminary to a general peace' (d_4)

The author sounds three cautionary notes: a victorious nation must not insist on an excessively harsh peace settlement; it must beware of over-extending its dominions; its military successes may conceal, and even increase, its domestic wretchedness.

The second warning, against ill-considered colonisation, was to be elaborated in letters 17 and 25 of *The Citizen of the World*, and was also propounded in Goldsmith's unpublished fragment 'The Political View of the Present War', which probably dates from 1760–1 (Crane, 1927, p. 91). There are, however, no parallels with earlier genuine material. But the relationship between d_4 and an earlier doubtful text, 'Public Rejoicings for Victory' (our d_{18}) is undeniable. That essay had appeared two months previously in the *Busy Body*. Its two final paragraphs rehearse the first and third of the warnings sounded in 'Thoughts on Peace', and there are striking verbal parallels (Crane 1927, pp. 91,93,94; Friedman). The links are sufficient to suggest that the same hand was at work, and the parallels between both essays and later Goldsmith (d_{18} has connections with letters 4 and 17 of *The Citizen of the World*) would seem to confirm that hand as Goldsmith's. For Crane and Friedman this evidence was decisive (Crane, 1927, p. 89; *Works*, iii, p. 4, 30).

We note some small counter-indications:

(i) 'Thoughts on Peace' begins with the phrase 'The empire of England'. Goldsmith prefers 'the British empire' (*Works*, iii, p. 175.5; *History of England*, 1764, ii, p. 234).
(ii) 'our natural country' (*Works*, iii, p. 33.1); none of the twelve occurrences of *natural* in the corpus has the meaning of 'native' (*OED* last records the phrase 'natural country' in 1585).
(iii) More hesitantly we adduce a heavy-handedness that seems untypical of Goldsmith even at his most serious: 'The conjuncture is decisive in [England's] favour . . . '; 'Indemnification for what is past, and security for the future, are the essential objects in a treaty of pacification, but both these may be easily effected without any accession to our present dominions.'

Given the web of parallels we expected that, despite these anomalies, our results for both doubtfuls would be similar and very favourable. The linguistic features scores for 'Public Rejoicings' are certainly favourable. In contrast, both samples from 'Thoughts on Peace' have emphatically adverse scores. Though the essay therefore looks distinctly unlike Goldsmith, we do not propose that these scores should automatically trump the evidence from the verbal parallels. As M.W.A. Smith has said, 'a strongly held scholarly consensus should take precedence over an unexpected stylometric result until the conflict can be resolved' (Smith, 1992, p. 436, n. l4); the judgement is made the more telling by Smith's record as practitioner and champion of rigorous stylometric investigation. To help resolve the conflict we suggest that in writing 'Thoughts on Peace' as a weighty sequel to the more light-hearted 'Public Rejoicings' Goldsmith drew for some of his political arguments on ideas and phraseology which he had picked up from contemporary pamphlets or from coffee-house conversation (It is just conceivable that another member of the 'Society of Gentlemen' lent a hand).

6.4 'Memoirs of berkeley' (d_5)

The sole reason for attributing this piece to Goldsmith is that it reports the dangerous experiment in which Berkeley was assisted by his 'companion (whose name was Contarine, and from whom I had the story)'. This Contarine was Goldsmith's uncle, a relationship which according to Friedman makes it 'very probable' that Goldsmith 'was the author of the anecdote and the memoirs' (*Works*, iii, p. 35, and note). Who but Goldsmith, Friedman asks, would have had access to the source? Morris Golden thought that Friedman had proceeded too hastily from the part to the whole: Goldsmith could have communicated the story to whoever was preparing the 'Memoirs' for publication, or could have inserted it in the submitted manuscript.

The second sample from this piece (s_9) has a score for linguistic features in the 'unlikely' category. Its sentence-length results set the whole essay at a distance from Goldsmith, and further evidence is provided by two visible markers:

(i) In the corpus the ratio of occurrences of the verbal phrase *to regard* as to the virtually synonymous *look upon/on* as is 8:3; in d_5 it is 1:4.

(ii) The author of d_5 has a predilection for the syntactic process known as 'fronting', in which the direct object or prepositional complement of the verb precedes its subject. Thus:

> The country, which was desolate and unimproved, he took the utmost pains to improve . . .
> . . . the dispensation of charity he looked upon as his duty.
> music he was particularly fond of . . . .
> His income he was entirely contented with . . . (pp. 34, 37; *Works*, iii, pp. 37, 40)

There are in all nine occurrences, an average of four in 750 words. Twelve of our forty Goldsmith 750-word samples contain a single instance of such inversion; in just one sample it occurs twice. More important, for Goldsmith this structure always carries a deictic or exclamatory charge: 'this she might have enjoyed'; 'Ingratitude, contempt, and hatred, I can now suffer' (*Works*, iii, p. 111, 65). This is the case in only three of d_5's examples.

Friedman cites no parallels with genuine Goldsmith. But the statement that 'They [Berkeley's 'Queries'] were read, approved for the most part, and forgotten' (p. 36; *Works*, iii, p. 39) echoes earlier summaries of literary fortunes: 'the poet . . . is praised by all, read by a few, and soon forgotten' (*Polite Learning*, *Works*, i, p. 317; cf. i, p. 110); and 'we have seen him read by a few, praised by all, and soon forgotten' (*Bee, Works*, i, p. 411). We suspect that, having added the Contarine anecdote to the memoir, Goldsmith was tempted to a little more tinkering, and chose to make further use of his pithy formulation. Perhaps the dry comment that a fellowship at Trinity College is 'the only reward of learning that kingdom has to bestow' (p. l8; *Works*, iii, p. 35) is yet another interpolation; in a letter of 1757 Goldsmith had lamented the paucity in Ireland of 'rewards to learned men' (Balderston, 1928, p. 29).

In short, like Golden, we consider this essay as similar to 'Manners of the Irish', in that Goldsmith has simply added here and there to another's text.

6.5 'The history of regnard' (d_6)

Regnard's life-story would have appealed to Goldsmith, with his keen eye for hardship and misery, and himself a gambler, traveller, and exile. There is, however, only one verbal parallel, pointed out by Crane (Crane, 1927, p. 133): the phrase 'philosophic vagabond', which Goldsmith had already used in the *Bee* (*Works*, i, p. 370), and which he reused in *The Vicar of Wakefield* (*Works*, iv, p. 106). Both samples from this mini-biography have favourable scores for linguistic features and sentence-length. The heavy reliance on the adverb *now* to maintain narrative momentum (eleven occurrences in 1500 words), and the repetition of a word or phrase within a very short space (examples include *at once*, *considerable*, and *attend*) are perhaps signs of haste. We suggest that Goldsmith was responsible for this 'History', but admit that he was in part merely condensing information from the prefatory biography in the 1758 edition of Regnard's *OEuvres* (of which his library held a copy at the time of his death: Amory, 1973, p. 244), together with material from another, untraced, source.

6.6 'The Life of the Hon. Robert Boyle' (d_7)

The first paragraph has close affinities with the beginning of the 'Memoirs of Voltaire', and with a letter of 1758 (Friedman). The commendation of the Irish practice of plunging an infant 'every day in cold water', which 'fits perhaps the mind not less than the body for vigor and dispatch' (p. 40; *Works*, iii, p. 41) echoes a statement in 'Of Education': siting schools 'a little out of town . . . would certainly conduce to the health and vigour of, perhaps, the mind, as well as the body' (*Bee*, *Works*, i, p. 456). Goldsmith's authorship is plausible in terms of sentence-length, but rather less so for linguistic features; the second sample (s_{14}) falls into the 'unlikely' class. We know that about half of the essay is borrowed from *Biographia Britannica*. Goldsmith may have blended that material with another source, his own contribution being limited once again to the opening paragraph and some incidental touches.

6.7 'Improvements and Discoveries that might attend a more extensive Knowledge of remote Countries' (d_8)

Of Goldsmith's strong interest in such 'improvements' there is no doubt. In 1756 or 1757 he spoke enthusiastically of going himself to decipher the inscriptions on the so-called 'written mountains' of Sinai (Percy, 1801, pp. 39–40). But thereafter his advocacy of travel to the Orient has a more practical emphasis. Six months before the appearance of this essay a reviewer in the *Critical*—*probably*, but not certainly Goldsmith—denigrates the collecting of 'mutilated inscriptions'; better to return home with a knowledge of dyestuffs (*Works*, i, pp. 183–5; on Goldsmith's authorship see Friedman, 1946, p. 35). Similarly Letter 108 of *The Citizen of the World* scoffs at travellers who merely transcribe inscriptions, and stresses the 'useful knowledge' and 'useful inventions' which they should bring home instead (*Works*, ii, pp. 419–20). The first third of d_8, on the other hand, encourages the investigation of books and inscriptions. It has no verbal parallels with Goldsmith.

The remaining two-thirds of the essay are linked to *The Citizen of the World*, Letter 89 (*Works*, ii, p. 361, where the relevant passage from the *Weekly* is quoted), and more firmly to Letter 108: 'In the most savage parts of India, they are possessed of the secret of dying vegetable substances scarlet; and likewise that of refining lead into a metal which, for hardness and colour, is little inferior to silver' (*Works*, ii, pp. 418–9). Compare: 'That mixed metal called tutaneg, which so nearly resembles silver, comes from the East, and we are entirely ignorant of the manner in which it is made . . . Some drugs . . . the method of dying leather scarlet . . . are all secrets that might be procured by industry and address' (p. 55). Moreover, when the writer suddenly asks 'Would not a knowledge of medicine and music be sufficient to carry a man thro' the most barren countries?' (p. 54), we cannot but notice that these are precisely the qualifications that Goldsmith could, with some justification, claim for himself.

The evidence from our tests is contradictory. Scores are favourable for linguistic features, but negative for sentence-length. A little more negative evidence is provided by the adverb *still*, averaging five occurrences in 750 words, whereas no Goldsmith sample has more than two.

This unstructured, unpolished piece is unworthy to be called an essay. Seven of its thirty-three sentences begin with a limp 'There are', 'There seems', 'It were well' (or 'well worth'), and the like, while its numerous rhetorical questions give it an importunate air: 'Might not the inland parts of Africa be known . . . ?' 'Could not China be easily seen . . . ?' Declining to invoke the 'argument from quality' we conclude that Goldsmith has to take some responsibility for what is probably a joint production. If, as seems likely, he consulted it when he prepared his Chinese philosopher's reflections on the benefits of travel (Letter 108), he fashioned from some of its elements a more temperate and elegant composition.

6.8 'A Sublime Passage in a French Sermon' (d_9)

The 'sublime passage' had already been quoted in the *Bee*'s article 'Of Eloquence' (*Works*, i, p. 479), while 'Some Remarks on the modern Manner of Preaching', which appeared just three numbers later in the *Weekly*, and which is certainly Goldsmith's, could justifiably have been entitled 'Another sublime Passage . . . '. These three essays are so intimately connected that Friedman judged Goldsmith's authorship of this piece to be 'very highly probable'. Our results endorse his verdict.

6.9 'The Futility of Criticism' (d_{10})

Our results are favourable, and we can add a further parallel to the very persuasive ones listed by Friedman: 'the critics of the Augustan period . . . were all for harmony, short periods, and such prose as might be sung as well as spoken' (p. 61; *Works*, iii, p. 53). Compare, from *Polite Learning*, 'a declamation, that might be sung as well as spoken' (*Works*, i, p. 268), and from the *Bee*: Roman orators whose 'periods . . . were so harmonious, that they could be sung as well as spoken' (*Works*, i, p. 464).

6.10 'On the present State of our Theatres' (d_{11})

Goldsmith had used the image of a 'losing gamester' when reviewing Home's *Douglas*, and consistently expressed dissatisfaction with the taste of contemporary audiences (Friedman), as well as hostility to 'the character of harlequin and pantomime in general' (Golden). Friedman cautiously admitted this piece to the *Works* (iii, p. 54, n. 1). Our favourable results lead us to be rather more welcoming.

6.11 'The Modern Taste in Music considered' (d_{12})

Friedman noted, first, a small connection between this essay and 'Of the Opera in England', the last item in the *Bee*; the complaints about over-extended vocal ornaments are, in our view, not distinctive enough to bear much weight. He demonstrated, secondly, far more substantial links with 'On the Different Schools of Music', published only fourteen days later in the *British Magazine*. If there were good grounds for attributing this second essay to Goldsmith, the case for d_{12} might be strengthened. But 'Schools of Music' (our d_{17}) has no parallels with genuine work, and negative scores for linguistic features. It also contains a very visible marker in the word *though*, which occurs seven times in 868 words, a ratio of 1:124; the corpus has a ratio of 1:866. More important, five of the seven occurrences are in *though . . . yet* constructions: 'though [Handel's] English oratorios are accounted inimitable, yet his Italian operas are fallen into oblivion' (*Works*, iii, p. 93). In the essay the frequency ratio for this construction is 1:174 words. The corpus has a total of eleven such constructions, or one in 3,465 words. Since its own authenticity is, to say the least, uncertain, this essay cannot be used to authenticate another doubtful text.

To return to 'The Modern Taste in Music': it looks, on all counts, even less like a Goldsmith essay, with an unequivocally negative score for linguistic features and no more than a borderline one for sentence-length. There are no verbal parallels, with the exception of a small but remarkable bond with Goldsmith's essay 'On the modern Manner of Preaching', published just a fortnight later in the *Weekly*. 'Taste in Music' admits that 'All these remarks are so trite, that it almost demands an apology to repeat them. Yet trite as they are . . .' (p. 95). 'On . . . Preaching' confesses that Horace's 'Si vis me flere . . .' is 'so trite a quotation that it almost demands an apology to repeat it; yet though all allow . . .' (p. 4; *Works*, iii, p. 12). Perhaps Goldsmith unthinkingly reproduced a wording which had caught his eye in the earlier number. Or he may be using a conventional formula, a kind of 'modesty topos'.

The close relationship in content and phrasing between 'Taste in Music' and 'Schools of Music' suggests a common authorship. Stylometric tests, and the absence of definite parallels further suggest that Goldsmith is unlikely to be the author of either essay. We believe that Friedman was right to exclude 'Taste in Music' from the canon, and wonder whether 'Schools of Music' deserves a place there.

6.12 [A letter on Gamesters] (d_{13})

All our results are decidedly negative. As the most unlike Goldsmith of all the doubtfuls, it is the most unlikely to be his. There is, however, an interesting complication. As Lonsdale points out, the piece contains 'striking anticipations' of passages in a long, cautionary letter on the same subject, from Richard ('Beau') Nash to an unnamed lord; the letter is reproduced in Goldsmith's *Life of Nash*, 1762 (Lonsdale, 1986, p. 223; *Works*, iii, pp. 379–88). Prior suspected that Nash's letter was actually written by Goldsmith, but as Friedman observed, 'It would not seem easy to prove or disprove this assertion' (*Works*, iii, p. 379 n. 2). We are unable to help. The sternly admonitory tone is too remote from anything in the corpus to allow a valid comparison. The letter is said to have been 'prepared by [Nash] for the press', a statement which could well conceal some rewriting by his biographer. We conjecture that in remodelling Nash's manuscript, Goldsmith remembered the 'Letter on Gamesters' (it deals with a topic close to his heart), looked it up, and transferred several relevant sentences to Richard Nash.

6.13 'A Concise History and Reflections upon modern Painting' (d_{14})

In this translation nine sentences in the French original are split into two or three English ones. This procedure was certainly a feature of Goldsmith's method as a translator, to judge from the three items in the *Bee* scrupulously analysed by Graham Gargett (Gargett, 2003, pp. 843–5, 851). But here the lengths of the twenty-two sentences available for testing are not convincingly like Goldsmith. There is, too, less freedom in the rendering than he normally allows himself. Roger Lonsdale attributes the translation to Goldsmith (Lonsdale, 1986, p. 221). We cannot press our frail evidence too hard, but on balance it seems rather unlikely that he was responsible. The original is an article in volume five of the *Encylopédie*. Goldsmith's familiarity with, and exploitation of this volume is well attested (see, for example, Friedman, 1935, p. 285, and *Works*, iii, p. 90, n.l); the idea of translating the material may have originated with him.

6.14 'Some Rules by which a Man may appear learned' (d_{15})

The author's antipathy to metaphysics is shared by Goldsmith, though also by several contemporaries (Golden; *Works*, i, p. 271; ii, p. 265; v, p. 294). In an early review he mocks the pedant who takes 'refuge behind Arabic' (*Works*, i, p. 161); so here: 'Two or three words of Arabic in the oriental character would be of great use, men commonly love to look upon Arabic' (pp. 13–4). Perhaps suggestive of Goldsmith's authorship is the twist given to a (slightly misquoted) line from Pope's *Essay on Criticism*: 'If unexpectedly a book should give you pleasure . . . be very phlegmatic in its praise; fools may admire but men of sense approve' (p. 13). In this context 'approve' means no more than to accord grudgingly the faintest of faint praise, whereas in the original it is to give judicious and sincere approbation. Compare, from the *Bee*: 'As for the polite, they are so very polite, as never to applaud [a literary work] upon any account. One of these, with a face screwed up into affectation, tells you, that fools may *admire*, but men of sense only *approve*' (*Works*, i, p. 417). Finally, the items in Goldsmith's 'Specimen of a Magazine' include two brief sets of lighthearted rules (*Works*, iii, pp. 193–4, and see pp. 15–6 for another humorous set).

Scores for both sentence-length and linguistic features are favourable, thus supporting Lonsdale's attractive suggestion that the 'Rules' were the promised sequel, hurriedly prepared, to 'The Futility of Criticism' (our d_{10}; Lonsdale, 1986, p. 222).

6.15 'Theatrical Amusements' (d_{16})

'There has been this season a sharp contention between our two theatrical managers for the favour of the town; pantomime has been opposed to farce, and wire-walking to puppet-shew' (p. l4). The opening sentence echoes the 'similar ironic emphasis on theatrical ''opposition'' at the beginning of the ''Present State of the Theatres''' (our d_{11}; Lonsdale, 1986, p. 222). Goldsmith's Chinese philosopher is likewise amused by the hostilities at the start of the following theatrical season (*Works*, ii, pp. 323–4). Our tests indicate that this item could be Goldsmith's. There are, however, no further parallels with his work, while the second half of the piece manifests some striking dissimilarities. To describe *The Tempest* as 'one of the most pleasing productions of the creative imagination of Shakespear' (p. 15) does not square with the very qualified praise of Shakespearian drama, which Goldsmith had expressed only nine months earlier in *Polite Learning*(*Works*, iii, p. 326). And the account of *The Way to Keep Him* is almost entirely plot-summary, something that Goldsmith eschews in his dramatic criticism (e.g. *Works*, i, pp. 10–12, 170–79 [probably, though not certainly, his] and 450–52).

This item has the air of a joint production, probably stitched together in haste, with Goldsmith responsible for the first two paragraphs, the remainder being the work of the same contributor who rather unkindly revisited, just two pages later, the unfortunate première of *The Desert Island*.

7 Conclusion

Morris Golden perceived a stylistic discrepancy between the introductory paragraphs and the central section of the 'Manners of the Irish'. This prompted him to suggest that 'Goldsmith was employed by the periodical partly to do editorial work and that he touched up or added to the work of others', procedures which Golden also suspected in the 'Memoirs of Berkeley'. Our analyses reinforce his suspicions in both cases, while the life of Boyle is perhaps another example of touching up. Such intervention, as we have seen, was standard editorial practice. Goldsmith, in an editorial capacity, could have proposed the translation from the *Encyclopédie* which appeared as 'Modern Painting', and three other features of the journal may point to his role in gathering material and shaping policy (We are mindful of Johnson's observation on a certain Shakespearian commentator who 'did not easily miss what he desired to find': Johnson, 1968, p. 83).

(i) Whether or not Goldsmith wrote the piece about discoveries in remote countries, its position as the lead item in the third number perhaps reflects his strong interest in the topic.

(ii) The first article in the second number is a translation from Voltaire entitled 'Considerations upon History', while the longest single item in the journal is an abridged translation of his recently published *Socrate* (pp. 85–95). They may both owe their presence to Goldsmith's great admiration for Voltaire. He had already written his 'Memoirs of Voltaire', the life, as he described it to his brother Henry, of a 'very extraordinary man' (Balderston, 1928, p. 63).

(iii) A brief 'Word to the Reader' introduces the sixth number:

> Even while we strive to solicit attention by a preface, we are conscious of the futility of our endeavour. All that we can promise has been promised by others already; nothing that we can attempt but former literary adventurers have aimed at. We must appeal therefore from our plan to our execution; we would rest the merits of our claim upon that only, and could wish to find applause, less from the novelty of our design, than our care in conducting it . . . . To say more would be a tax upon the reader's patience; to say less, would be injustice to ourselves.

The text is too short (271 words) to be amenable to our tests. We may, however, compare a sentence in the later 'Specimen of a Magazine': 'To say more in favour of the INFERNAL MAGAZINE, would be unworthy the Publick; to say less, would be injurious to ourselves' (*Works*, iii, p. 192). This parallel, together with the balance and poise of the writing, and the suave modesty of the tone incline us to attribute this short preface to Goldsmith.

What the 'Word to the Reader' went on to promise was an injection of new energy and a revamped format. But there was a shortage of readers willing to be addressed, and the journal was about to fold. Goldsmith appears to have contributed nothing original to the fourth and fifth numbers, although a humorous petition from the 'Goddess of Silence', reprinted from the *Public Ledger*, is probably his (Dixon and Mannion, 2001, p. 315); in the week between numbers four and five he was occupied in launching the 'Chinese Letters' in that journal. Yet with characteristic generosity he then threw himself into a last-ditch attempt to save the *Weekly*. Besides his probable contributions—'Rules to appear learned', part of 'Theatrical Amusements' and the introductory 'Word to the Reader'—Goldsmith's share in the final number includes the substantial discussion of 'the modern Manner of Preaching' which he reprinted in *Essays*. The almost absurd overlap between this piece and the 'French Sermon' essay (d_9) of three weeks before, suggests that Goldsmith originally intended it for another journal. The *Royal Magazine* and the *British*, to both of which he had very recently contributed, are strong candidates. In their pages the plea for earnest pulpit delivery would not have tasted like a reheated dish, nor is it likely that the (unconscious?) repetition of the modesty formula from the essay on music would have been spotted.

The extent of Goldsmith's involvement in the *Weekly*, as both 'editorial worker' and contributor remains uncertain. We can be categorical only about the three items—two essays and a poem—which he

later reprinted. It is, however, highly probable that he was the author of 'Thoughts on Peace', 'A sublime Passage in a French Sermon', 'The Futility of Criticism', and 'On the present State of our Theatres', for all of which Friedman was a persuasive advocate. It is quite possible that he wrote the 'Introduction', 'The History of Regnard', and 'Rules to appear learned'. We would grant him only a collaborative role, though not a subordinate one, in the essay on discoveries to be made in remote countries, and in 'Theatrical Amusements', and restrict him to an editorial role in 'Manners of the Irish' and the lives of Berkeley and Boyle. Even at the most conservative estimate, this represents a not inconsiderable contribution to this short-lived magazine, and a serious attempt to keep it afloat at a time when he was busy with other journalistic work. We must admit that none of the pieces we have examined represents him at his best, but 'of such a writer even in his more careless effusions, who would willingly lose anything?' (Prior, 1837, i, p. 345).

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Notes

1. We accept Lonsdale's argument that the changes to the sixth number, in format and publisher, most likely represent a doomed attempt to keep the journal afloat, not the launch of a new project (Lonsdale, 1986, p. 221).
2. See also *The World*, nos. 23 and 19, and Donald Greene's discussion of Johnson's role as editor of the *Literary Magazine* (Greene, 1956, p. 379, 380, 389).

Appendix A

Linguistic features.
(fb = followed by)

1. Occurrences of a group of emphatic words: *even*, *ever*, *every*, *much*, *only*, *so*, *such*, *too*, *whole* (n. and adj.), *yet*.
2. Total number of verbs, main and auxiliary.
3. Occurrences of present and past participles and gerunds.
4. Ratio (as a percentage of all main verbs) of verbs fb a preposition or prepositional adverb.
5. Occurrences of expressions of negation (other than verbs), such as *nay*, *no*, *nothing*, including words with negative prefixes and suffixes.
6. Ratio of complex sentences to compound + compound-complex sentences.
7. Word-patterns of the type 'from scenes of blood and altercation, to prospects of innocence and ease' or 'as much entertainment, or as much elegance' (*Works*, i, pp. 355, 356); i.e. the same sequence of identical grammaticalunits, normally on either side of a mark of punctuation and/or a co-ordinating conjunction or connecting phrase. Scores arecalculated according to the lengths of the word-strings: so six and three points respectively for the above examples.
8. Occurrences of selected expressions of contrast, difference, and reservation, eg. *however*, *instead of*, *neither . . . nor*.
9. Percentage of sentences beginning with a subordinate clause.
10. Occurrences of *for* (both conjunction and preposition).
11. Occurrences of tentative expressions, understatements, concessive words and phrases, formulas of politeness and modesty, eg. *perhaps*, *give me leave*, for my part, possibly.
12. Occurrences of noun or pronoun fb adverb or adverbial phrase.
13. Ratio of main clauses to main + subordinate clauses (other than 'reporting' clauses such as 'he said').
14. Percentage of sentences with a main verb as the penultimate word.
15. Occurrences of noun or pronoun fb auxiliary verb.
16. Percentage of sentences terminating in an adjective or adverb, or equivalent phrase.
17. Occurrences of *the* fb *adjective*, as a percentage of all occurrences of *the*.
18. Occurrences of a co-ordinating or subordinating conjunction or relative pronoun fb a relative pronoun or subordinating conjunction, e.g. *and that*, *but although*, *that if*, *if when*.
19. Ratio, as a percentage of all main verbs, of occurrences of *to be* and *to find*.
20. Total number of adjectives.
21. Occurrences of noun or adjective + coordinating conjunction + noun or adjective, e.g. 'blood and altercation', 'ridiculous or pleasing light'.
22. Percentage of sentences having a deictic (excluding pronouns) or connective among their first four words.
23. Occurrences of *that* and *zero-that* clauses.
24. Percentage of single-clause sentences.
25. Occurrences of selected deictics and connectives, including *accordingly*, *also*, *besides*, *on this occasion, thus*.

26. Occurrences of preposition fb present participle or gerund.
27. Occurrences of three- and four-word prepositional phrases, e.g. 'in this situation', 'a labourer in the magazine trade'.
28. Adjective/verb ratio.
29. Occurrences of selected adverbs.
30. Words and constructions favoured by Goldsmith (though not uniquely his): twenty items, including triplets, *but* (= only), *still* fb *however, at last*.
31. Ratio, as a percentage of main verbs, of verb fb infinitive, e.g. 'happen to come'.
32. Percentage of sentences terminating in a monosyllable.
33. Occurrences of *by* and *with*.
34. Occurrences of a group of intensives: *all, any, entire -ly, indeed, must, very*.
35. Occurrences of *as, or, so, such* (the last two only when unemphatic).

Appendix B

Goldsmith's Contemporaries

Our tests are based on the following material; essays used only for sentence measures are enclosed in square brackets. The years cited are those in which the essays appeared.

John Boyle, 5th Earl of Cork, *The World*, nos. 47, 68, 161 (1753–6); *The Connoisseur*, no. 23 (1754). [Not used for tests of sentence-length]

Richard Owen Cambridge, *The World*, nos. 107, 108, 116 [123, 206] (1755–6).

George Colman and Bonnell Thornton, *The Connoisseur*, nos. 8, 57, 71, 80, 114 [131] (1754–6).

Samuel Johnson, *The Adventurer*, nos. 67, 84 [45, 99, 102] (1753); *The Idler*, nos. 2, 26 [53, 83, 100] (1758–60).

Hugh Kelly, *The Babler*, nos. 3, 9, 17, 19, 36, 41 [for sentence-length: 9,17,19, 46, 66] (1763–4).

Edward Moore, *The World*, nos. 75, 128, 138, 173 [194] (1754–6).

Arthur Murphy, *The Gray's Inn Journal*, nos. 52, 68, 79, 84 [for sentence-length: 68, 76, 79, 84, 91] (1753–4).

Philip Dormer Stanhope, 4th Earl of Chesterfield, *The World*, nos. 24, 49, 105 [100, 111] (1753–5).

Horace Walpole, *The World*, nos. 6, 10, 14, 28 [103] (1753–4).

Joseph Warton, *The Adventurer*, nos. 109, 129, 133, 139 [127] (1753–4).

Appendix C

Table 1 Goldsmith data

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																			
1	7	162	15	19	15	75	35	7	33	8	11	7	38	10	25	10	19	3	18	50	12	33	7	7	9	5	43	30	14	14	7	24	10	12	15
2	10	149	11	22	16	86	8	3	19	5	8	6	38	6	25	6	19	3	24	47	8	34	7	9	10	4	55	30	16	12	6	22	8	11	17
3	13	130	15	26	19	63	13	3	29	8	9	7	40	3	15	6	16	2	16	49	7	23	7	13	5	5	56	31	11	11	5	34	9	7	14
4	10	150	18	17	8	50	12	3	14	9	9	5	40	6	17	9	28	3	10	54	4	23	6	34	3	2	52	31	17	14	4	33	7	10	16
5	11	140	12	18	19	67	7	2	19	6	11	10	43	8	12	14	29	3	24	57	7	22	7	17	7	5	42	33	12	11	8	20	9	8	12
6	15	141	10	26	18	68	34	2	21	1	6	5	47	18	19	18	26	1	20	44	7	24	1	18	6	5	52	28	13	12	4	31	20	9	16
7	8	136	14	25	15	74	13	7	26	7	6	4	36	3	16	10	14	5	16	41	4	32	3	26	8	5	59	28	13	15	7	26	13	6	7
8	13	152	15	21	21	65	17	5	20	4	6	9	40	16	19	20	11	3	11	45	6	20	8	20	9	1	37	26	18	11	6	37	9	4	10
9	5	140	20	19	9	61	25	1	18	4	7	5	35	4	17	7	9	3	14	38	7	39	3	18	5	10	43	25	18	12	10	31	10	14	12
10	15	163	4	17	12	67	13	1	21	8	17	14	34	18	18	9	34	3	22	47	6	24	10	18	6	4	42	27	17	12	6	30	8	7	12
11	10	170	11	17	20	50	12	3	16	8	6	6	44	11	20	11	26	2	16	40	3	19	9	19	11	6	39	23	15	13	4	35	8	10	9
12	12	150	11	17	20	72	29	9	20	9	4	6	39	10	24	3	20	2	24	54	4	27	9	17	8	7	58	32	18	12	7	29	13	8	15
13	14	140	10	21	21	41	23	1	3	3	13	7	55	13	16	5	21	3	14	61	7	18	3	33	5	4	38	36	20	13	2	30	10	4	7
14	15	140	7	22	14	61	18	4	15	3	12	4	46	18	25	9	20	4	29	44	7	24	6	30	5	2	47	31	13	13	5	42	7	12	11

(Continued)

Table 1 Continued

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																			
15	9	151	18	23	13	70	16	3	22	4	13	7	35	0	28	7	11	4	29	36	6	26	9	15	7	4	49	25	20	15	2	31	9	7	8
16	10	166	13	27	25	86	9	5	38	8	12	10	33	10	31	5	26	5	17	52	10	33	5	0	10	1	39	31	19	23	6	25	9	6	15
17	14	158	8	20	6	64	36	3	15	6	12	6	36	7	27	15	30	2	12	52	5	30	3	19	8	3	40	34	10	13	7	31	11	7	19
18	16	142	16	25	18	71	19	3	26	8	12	6	40	10	22	10	29	3	22	48	3	26	4	32	7	8	49	31	15	13	7	45	13	12	11
19	14	151	14	27	8	76	11	2	19	9	17	7	32	8	20	4	25	4	9	46	3	23	4	19	5	6	55	30	13	7	6	44	12	9	9
20	14	131	16	25	21	62	34	1	13	2	6	9	44	10	11	3	29	1	8	45	5	17	2	30	6	3	53	30	15	12	8	44	14	12	4
21	7	128	21	21	15	60	16	1	8	3	6	7	48	5	13	8	27	0	17	59	10	17	2	49	3	2	58	37	16	13	2	37	7	4	4
22	13	150	16	11	18	70	17	5	13	15	8	8	46	18	19	11	19	1	16	54	10	32	5	29	8	3	43	32	14	8	5	28	8	10	14
23	11	150	7	18	28	56	15	8	6	6	9	13	47	23	16	14	32	1	29	59	7	26	2	23	5	0	35	34	17	29	3	21	11	14	5
24	13	146	14	19	17	40	16	2	7	13	8	10	47	7	18	10	23	2	19	45	5	34	5	17	5	7	39	28	15	9	6	34	12	12	9
25	14	150	12	18	20	66	32	2	6	5	8	7	45	6	17	8	22	4	18	58	4	39	5	19	8	1	38	32	17	13	5	33	10	7	12
26	15	160	9	16	13	52	19	5	13	5	10	16	47	10	21	18	19	3	19	43	6	21	8	26	4	1	31	26	18	20	7	38	6	12	12
27	15	138	5	13	13	70	33	8	3	8	9	7	44	6	22	19	32	1	19	54	10	31	6	28	7	3	36	33	22	17	1	25	12	3	12
28	17	149	7	24	17	43	10	6	14	4	8	9	59	16	20	14	11	2	16	32	10	33	3	30	6	2	50	21	13	15	8	30	10	4	11
29	10	152	13	27	12	63	17	3	5	9	9	9	46	11	17	5	10	5	23	41	7	16	9	29	6	6	40	25	15	14	6	32	12	6	8
30	16	147	12	23	11	50	11	2	8	6	12	8	52	3	21	14	13	2	24	44	9	22	3	28	1	4	50	28	17	12	9	30	14	8	11
31	9	137	12	18	19	63	18	2	6	6	8	4	51	3	17	11	18	2	19	65	9	29	1	23	5	4	56	38	9	7	7	44	7	3	9
32	10	144	8	31	14	63	10	2	30	5	8	10	45	6	20	15	27	3	15	45	5	30	5	27	7	1	48	30	18	8	7	35	11	8	8
33	16	140	18	28	22	56	17	2	9	7	10	6	42	13	17	19	22	1	19	45	11	16	2	16	2	5	56	29	11	9	4	26	6	6	10
34	8	168	10	26	10	39	10	2	18	12	12	10	51	16	28	21	5	3	18	29	4	32	7	18	9	2	40	18	9	16	6	59	2	9	7
35	4	165	7	24	14	43	7	4	15	7	7	11	50	18	26	21	14	3	13	25	3	38	8	18	9	1	48	16	14	7	6	40	12	5	6
36	11	153	6	14	21	61	16	2	21	7	11	8	46	12	14	22	11	4	22	47	3	20	7	21	6	2	37	27	17	9	3	36	12	8	13
37	9	139	15	25	10	73	13	4	10	5	14	9	37	6	20	3	41	3	25	65	10	26	6	16	4	6	52	39	18	10	4	23	14	9	8
38	15	145	18	21	11	84	21	7	9	5	17	6	37	6	24	16	15	1	13	52	5	19	6	22	3	15	55	33	15	10	1	14	15	7	9
39	20	140	21	23	12	73	13	4	20	4	16	8	38	13	22	20	13	2	18	49	2	31	8	13	13	7	40	31	18	13	3	48	11	10	12
40	3	150	13	23	11	71	11	5	9	8	7	9	41	14	23	14	22	2	21	40	2	34	7	20	9	5	39	26	18	11	5	49	3	11	7

Table 2 Control data

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																			
Johnson	13	125	8	30	22	78	31	2	19	5	4	1	30	10	18	5	20	6	18	49	18	25	4	14	3	3	48	33	13	6	3	33	21	6	11
	15	145	11	24	17	73	25	2	25	6	6	4	33	13	21	4	20	9	22	57	10	30	7	8	3	3	48	35	14	7	5	44	11	7	18
	5	149	19	30	14	50	15	0	14	13	6	1	32	9	13	9	26	5	17	41	4	32	12	18	3	7	60	25	17	3	6	24	17	9	10
	10	157	12	18	28	70	45	5	13	5	5	2	26	4	24	4	15	3	15	37	6	32	8	13	6	8	52	24	18	6	6	13	9	5	9
	5	182	6	20	27	48	16	5	9	5	5	4	40	9	29	9	33	3	15	52	4	13	8	24	3	1	48	29	14	10	6	41	10	9	3
Warton	2	138	14	17	12	65	10	3	11	7	1	9	38	4	14	7	43	5	19	67	9	27	8	15	1	6	58	39	15	9	8	29	14	4	5
	8	122	9	25	12	55	31	5	8	8	2	5	34	12	17	8	28	3	17	72	14	20	4	12	0	3	61	44	11	5	12	25	8	7	5
	6	131	10	17	22	71	22	2	8	10	5	9	33	4	16	4	39	3	23	83	32	25	7	16	3	3	39	45	17	4	12	13	12	2	13
	12	138	4	11	20	61	20	5	8	3	6	2	39	8	28	23	45	4	27	90	29	15	8	12	4	1	30	49	12	9	15	23	6	4	11
	10	137	6	35	10	33	29	3	4	2	5	7	39	8	26	4	18	4	14	41	17	40	5	16	4	2	56	32	19	7	3	10	22	1	10
Murphy	3	137	4	21	12	56	10	1	13	7	6	8	34	0	29	17	21	5	24	44	8	30	9	22	2	0	51	31	15	13	4	50	10	9	9
	4	122	11	27	19	50	12	3	13	4	12	4	23	0	24	13	28	7	28	61	6	36	14	13	5	2	58	40	16	7	1	35	15	16	11
	10	126	5	22	18	64	13	6	8	5	11	0	36	12	17	8	20	6	22	56	10	28	3	12	5	1	52	36	11	10	8	32	8	4	4
	7	125	6	21	14	56	24	5	12	7	7	3	34	8	22	0	37	2	20	67	7	28	12	28	3	4	56	42	18	7	5	28	11	7	9
	4	136	7	15	13	50	11	1	28	11	6	2	36	13	24	4	26	5	15	62	4	43	8	12	5	3	67	40	13	7	5	28	11	4	8
	6	121	6	24	9	63	10	2	3	3	2	5	47	3	18	9	26	3	19	57	7	26	7	31	5	3	57	37	13	5	6	38	6	8	6
Moore	7	160	10	24	10	73	8	4	8	7	10	4	26	20	31	8	20	8	25	34	4	36	16	12	8	8	44	23	17	11	6	48	7	2	8
	10	141	14	8	17	60	9	5	24	6	10	3	28	0	19	24	27	11	25	40	17	32	14	0	6	7	49	27	21	4	2	20	13	7	13
	7	139	10	23	10	65	30	4	12	9	8	4	26	0	27	8	10	8	30	44	9	40	11	8	8	7	50	30	9	10	8	24	11	6	12

(Continued)

Table 2 Continued

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																			
	9	156	12	22	18	68	11	0	16	8	8	5	25	20	39	4	33	4	13	48	8	44	10	12	3	7	53	33	11	9	5	52	9	8	13
	8	147	9	23	8	67	7	0	20	7	5	7	28	20	25	12	19	5	26	40	6	32	11	4	3	4	55	27	13	6	4	28	12	11	6
Chesterfield	17	106	6	20	21	50	27	4	24	7	4	5	41	4	15	4	45	1	18	74	14	16	2	28	4	3	50	48	15	3	8	20	12	8	18
	14	94	13	23	19	71	33	4	4	5	14	12	36	12	10	4	25	1	20	76	20	44	2	16	5	6	57	51	21	9	4	24	13	17	15
	10	118	9	24	19	68	18	5	16	2	7	3	31	4	25	8	43	7	28	67	21	36	10	0	1	5	47	45	15	18	4	24	13	10	8
	7	117	8	17	15	42	21	3	4	6	4	6	41	8	20	8	47	1	14	81	19	20	4	24	1	1	51	49	16	10	2	24	13	6	8
	2	135	9	14	12	55	25	4	24	6	16	9	35	16	23	8	27	3	17	60	10	44	13	12	8	4	55	36	12	8	1	32	10	10	10
Cambridge	12	164	16	19	5	75	3	1	35	12	14	3	23	5	34	0	35	5	20	58	6	25	7	0	8	14	42	34	12	10	8	43	7	13	13
	2	149	13	10	14	55	44	2	30	6	5	1	39	4	28	7	36	8	12	41	12	19	6	26	3	8	36	28	5	6	2	38	13	12	6
	6	136	11	23	16	60	20	3	21	9	7	7	36	0	23	13	27	2	20	49	9	26	8	17	3	5	61	32	13	7	7	42	8	9	11
	11	141	18	15	16	77	18	4	15	5	5	9	33	4	21	4	43	2	15	67	9	46	10	15	4	9	45	39	18	14	6	13	11	18	7
	2	145	18	19	19	89	8	1	32	4	9	1	21	16	24	5	26	5	13	58	7	33	6	0	2	10	51	35	12	1	5	48	18	6	11
Walpole	13	144	13	25	14	89	18	2	16	4	8	2	29	0	29	0	28	2	15	56	5	24	12	28	3	2	57	37	14	4	5	36	12	7	12
	14	109	8	26	14	72	22	2	8	3	9	3	41	0	15	4	37	3	14	67	17	28	4	28	1	3	59	45	10	7	5	4	11	4	6
	6	162	10	25	22	90	11	1	18	5	8	3	33	7	36	0	45	4	21	60	5	14	10	25	1	2	56	38	15	5	6	37	11	4	8
	8	146	13	25	13	68	9	2	16	5	3	4	30	4	25	4	47	3	11	61	10	32	13	12	2	4	54	38	9	9	4	40	8	16	11
	12	133	5	19	11	82	31	4	7	7	11	6	35	7	29	3	33	3	22	53	7	21	10	24	1	4	61	36	20	7	2	57	5	8	12
Connoisseur	7	129	17	25	10	43	8	3	32	4	9	4	32	0	18	16	20	2	14	45	13	36	7	16	3	3	73	32	8	6	7	28	8	10	12
	8	131	15	20	11	52	22	3	16	7	4	4	39	16	22	6	37	3	17	55	7	39	6	13	3	9	56	35	14	5	5	29	13	10	10
	9	139	20	23	19	64	9	6	12	8	11	5	30	4	20	8	47	2	21	78	7	32	9	0	4	13	57	43	16	9	11	41	18	8	11
	7	132	16	19	14	67	10	2	5	7	3	7	40	3	19	11	29	1	16	42	2	28	10	19	3	6	46	28	11	22	5	47	11	10	9
	4	134	17	28	14	45	16	7	12	5	7	5	36	0	18	4	24	0	17	53	12	24	4	20	2	7	44	33	14	13	4	15	16	17	5
Cork	8	112	5	26	17	60	38	0	3	2	6	1	57	0	18	11	12	2	22	46	10	16	3	32	1	2	71	34	23	7	3	28	10	4	5
	5	128	13	20	17	80	8	1	12	4	5	5	36	0	18	8	37	2	14	53	9	36	6	20	3	5	54	36	9	11	6	33	7	8	9
	13	130	14	17	15	72	15	2	15	5	8	8	44	9	18	12	19	6	14	55	9	18	6	26	3	8	52	35	15	10	7	31	11	9	10
	6	123	8	31	6	35	23	2	12	1	6	8	40	8	22	4	41	2	9	50	11	16	3	20	1	1	59	36	13	11	3	44	12	4	13
	6	112	18	38	0	83	21	0	8	4	4	3	25	4	16	4	17	2	18	64	5	24	1	4	2	2	78	42	7	2	2	48	18	4	1
Kelly	7	133	8	23	15	78	15	8	19	5	6	5	40	0	21	8	26	3	23	42	5	21	7	12	2	3	49	29	11	13	5	15	4	9	11
	7	117	18	21	18	60	5	1	27	7	7	9	34	5	9	5	30	4	24	63	3	24	7	14	5	9	72	37	15	6	3	35	13	7	6
	9	131	16	27	12	38	42	3	23	3	7	6	50	7	21	7	15	2	16	44	2	21	3	20	0	5	57	30	19	6	4	72	6	11	4
	10	125	12	23	23	42	33	6	14	1	2	3	51	0	14	12	26	1	19	54	8	15	7	31	3	4	49	34	15	12	3	71	19	5	7
	14	115	9	36	19	43	12	1	24	9	7	5	34	12	13	8	33	2	13	65	4	36	5	8	4	6	73	41	15	11	5	62	15	8	6
	3	117	10	33	19	35	25	10	38	9	4	8	42	8	15	4	36	3	27	57	5	31	3	23	2	3	48	38	20	6	3	48	12	11	6
	9	145	10	19	19	58	1	1	15	10	6	8	40	7	21	11	27	5	18	42	1	37	16	11	6	5	51	26	13	7	5	64	10	11	2

Table 3 Doubtfuls data

Feature		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																				
d1	s1	11	127	11	19	11	88	26	4	24	13	8	5	29	12	22	0	17	5	14	51	5	53	3	6	6	1	53	34	9	9	12	24	4	4	18
d1	s2	11	148	4	25	12	70	5	1	19	12	7	1	39	12	22	19	23	5	12	49	7	27	3	23	5	0	53	30	5	7	7	46	9	16	9
d2	s3	6	132	12	20	13	62	22	8	18	5	15	6	58	12	19	15	31	3	28	73	12	25	4	21	5	1	43	43	19	15	6	33	8	11	10
d2	s4	12	137	17	18	18	79	6	6	12	10	6	6	48	15	15	21	29	5	14	40	6	42	7	12	9	2	49	27	15	13	8	30	17	6	5
d2	s5	13	129	6	28	10	48	14	2	16	9	7	8	56	19	19	13	27	1	13	40	8	55	4	19	13	0	57	28	13	13	9	48	9	12	12
d4	s6	17	138	10	13	14	78	23	1	10	6	10	4	37	10	29	25	39	7	28	68	4	37	9	10	8	4	45	41	4	12	1	45	14	7	12
d4	s7	15	141	9	18	26	60	28	7	13	3	7	7	45	4	23	21	5	3	27	65	16	21	4	17	7	3	44	40	10	12	1	46	10	4	19
d5	s8	9	133	15	32	10	52	10	5	19	9	5	9	46	6	16	13	27	2	13	43	9	42	0	35	11	1	62	29	13	10	6	28	6	2	13
d5	s9	17	115	6	19	13	40	21	2	4	5	4	5	56	4	16	14	32	0	27	46	18	25	4	29	4	2	53	33	16	10	7	21	16	0	16
d5	s10	13	129	8	15	13	48	16	6	4	4	12	11	48	12	19	15	32	5	13	50	5	42	2	12	4	1	43	34	14	14	5	27	13	11	13
d6	s11	8	127	15	22	9	54	10	1	3	6	4	11	41	6	10	13	26	2	19	50	4	34	4	19	5	5	52	32	18	9	7	31	16	7	10

(Continued)

Table 3 Continued

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Sample																																			
d6	s12	10	130	16	27	13	52	12	7	7	11	4	11	42	17	17	14	43	1	10	55	5	38	2	21	6	3	63	36	19	9	3	48	14	7	5
d7	s13	14	118	13	29	8	65	7	6	10	15	13	6	43	10	17	20	24	3	24	53	8	37	0	15	9	4	56	38	17	11	5	25	7	6	6
d7	s14	15	113	9	29	23	60	28	3	19	8	7	12	41	10	12	10	42	5	22	55	9	33	7	5	5	1	50	36	9	13	5	29	13	3	15
d8	s15	6	117	16	26	21	78	6	5	6	2	4	5	38	9	11	0	31	1	26	62	8	23	5	16	4	3	59	41	15	7	4	22	14	6	10
d9	s16	13	152	19	20	12	53	21	7	26	1	7	12	39	4	24	13	24	3	16	54	0	23	1	26	6	5	44	32	13	12	10	35	13	12	12
d10	s17	18	147	16	20	13	48	32	2	9	6	8	8	40	3	16	16	29	2	17	54	6	23	4	22	9	4	37	33	14	13	4	25	12	9	16
d11	s18	15	154	15	17	21	64	12	3	18	4	10	11	45	16	15	13	24	1	21	55	4	32	9	13	11	9	40	31	15	10	8	32	12	4	11
d12	s19	20	147	16	15	22	73	13	6	23	6	14	11	35	20	17	11	37	8	27	71	7	34	2	6	7	5	41	38	14	12	8	34	7	7	9
d13	s20	10	186	22	10	19	90	19	3	20	8	12	14	16	30	20	10	33	3	23	44	5	22	10	0	5	12	24	24	30	20	6	60	8	10	10
d15	s24	9	150	9	17	15	68	18	3	30	8	9	3	41	9	18	4	24	0	29	47	6	14	2	17	3	8	50	28	12	9	5	39	5	15	15
d16	s25	10	131	18	31	13	54	10	3	12	2	10	4	49	9	17	3	13	1	11	46	2	45	4	24	5	5	71	32	10	5	4	29	20	3	7
d17	s23	18	136	11	18	11	65	19	8	3	5	16	5	44	11	24	11	45	3	26	77	5	22	1	30	7	6	36	42	15	7	5	24	15	6	13
d18	s24	18	131	12	20	17	69	15	3	39	6	4	4	35	3	16	10	25	2	15	49	9	23	3	16	7	3	54	33	9	9	3	48	16	5	15
d18	s25	19	137	15	23	15	70	23	3	9	9	2	8	44	7	16	9	18	3	17	49	3	25	4	27	6	3	46	31	12	10	3	38	12	7	19

Table 4 Inclusion of a feature in the optimal set of features for a given value of q [indicated by star (*)]

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
q																																			
35	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
34	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
33	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*
32	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*
31	*	*	*	*	*	*	*	*	*		*	*	*	*	*		*	*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*
30	*	*	*	*	*	*	*	*	*		*	*	*	*	*			*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*
29	*	*	*	*	*	*	*		*		*	*	*	*	*			*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*
28	*	*	*	*	*	*	*		*		*	*	*	*	*			*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*	
27	*	*	*	*	*	*	*		*		*	*	*	*	*			*	*	*	*	*	*	*	*	*		*		*	*		*	*	*	
26	*	*	*	*	*	*	*		*		*	*	*	*	*			*	*	*	*		*	*	*	*		*		*	*			*		
25	*	*	*	*	*	*	*		*		*	*	*	*	*			*	*	*	*		*	*	*	*		*		*	*			*		
24	*	*	*	*	*	*			*		*	*	*	*				*	*	*	*		*	*	*	*		*		*	*	*		*		
23	*	*	*	*	*	*			*		*	*	*	*				*		*	*		*	*	*	*		*		*	*	*		*		
22	*	*	*	*	*	*			*		*	*	*		*			*	*		*		*	*	*	*		*		*	*			*		
21	*	*	*	*		*			*		*	*	*		*			*	*		*		*	*	*	*		*		*	*			*		
20	*	*		*	*	*			*		*		*	*	*			*		*	*		*	*	*	*		*		*	*					
19	*	*		*	*	*			*		*		*	*	*			*		*	*		*		*	*		*		*	*					
18	*	*		*		*			*		*	*	*		*			*		*	*		*		*	*		*		*	*					
17	*	*		*	*	*			*		*		*		*			*			*		*		*	*		*		*	*					
16	*	*	*		*	*			*		*		*					*		*	*		*		*	*		*		*						
15	*	*			*	*			*		*		*					*		*	*		*		*	*		*		*						
14		*			*	*			*		*		*					*		*	*		*		*	*		*		*						
13		*				*			*		*		*					*		*	*		*		*	*		*		*						
12		*				*			*		*		*		*			*			*		*		*	*		*								
11		*				*			*		*		*		*			*			*		*		*	*										
10		*				*			*		*		*		*			*			*		*			*										
9		*				*			*		*		*		*			*			*					*										
8		*				*									*			*			*		*		*	*										
7		*													*			*			*		*		*	*										

(Continued)

Table 4 Continued

Feature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
6		*													*						*		*		*	*									
5		*													*						*		*		*										
4		*													*						*		*												
3		*																			*		*												
2		*																			*														
1																												*							
Count	21	34	16	19	20	28	11	6	27	1	27	16	27	15	26	4	5	29	14	20	34	9	32	16	29	30	3	25	2	23	19	11	9	15	7

Table 5 Small *P-value* for distance of doubtful from centre of Goldsmith text [indicated by star (*)]

Doubtful sample	d1 s1	d1 s2	d2 s3	d2 s4	d2 s5	d4 s6	d4 s7	d5 s8	d5 s9	d5 s10	d6 s11	d6 s12	d7 s13	d7 s14	d8 s15	d9 s16	d10 s17	d11 s18	d12 s19	d13 s20	d15 s21	d16 s22	d17 s23	d18 s24	d18 s25
q																									
35				*																*			*		
34				*		*										*				*			*		
33				*		*	*									*			*	*			*		
32				*		*	*									*			*	*		*	*		
31				*		*	*									*			*	*		*	*		
30				*		*	*									*			*	*		*	*		
29				*			*									*			*	*		*	*		
28				*												*			*	*		*	*		
27				*												*			*	*		*	*		
26				*		*	*												*	*			*	*	
25		*		*						*									*	*			*		
24	*			*		*	*			*									*	*					
23	*			*		*	*			*				*					*	*				*	
22						*				*						*			*	*					
21						*	*			*						*			*	*					
20	*					*				*				*					*	*			*		
19	*					*			*										*	*			*		
18			*			*	*		*	*				*		*			*	*			*		
17	*		*			*			*										*	*				*	
16			*		*	*	*		*					*					*	*			*		
15			*		*	*	*		*					*					*	*			*		
14			*		*	*	*		*				*	*					*	*			*		
13			*		*	*	*		*				*	*					*	*			*		
12			*		*	*	*		*				*	*					*	*					
11	*				*	*			*				*	*					*	*					
10	*		*			*			*	*				*					*	*					
9	*		*			*			*	*				*					*	*					
8	*				*	*	*	*	*	*			*	*					*	*					
7	*				*	*	*	*	*	*			*	*		*		*	*	*					
6	*				*	*	*	*	*				*	*		*		*		*					
5					*	*	*	*	*				*	*	*	*				*					
4						*	*		*				*	*	*	*				*					
3							*		*				*	*	*	*				*					
2			*				*		*		*		*	*	*	*				*		*			
1			*			*	*						*		*			*	*				*		
Count	11	1	11	13	10	28	23	4	18	11	1	0	12	18	5	17	0	3	28	34	0	7	19	3	0