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*The Essex Hall Lecture - 1984*

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*Die ganzen Zahlen hat Gott gemacht, alles anderes ist  
Menschenwerk.*

‘GOD MADE THE WHOLE NUMBERS, all the rest is the work of man’. Thus Kronecker<sup>1</sup> emphasized the prime importance of number in the scheme of things. That there was something special, if not divine, about the cardinal numbers lay at the basis of much Pythagorean mysticism. Indeed, Greek philosophy accorded to mathematics, or to the reality of which mathematics was a description, an essential place in education. ‘Let none ignorant of geometry enter here’, was said to be inscribed above the entrance to the Academy.

British education, from its massive development in the later years of the last century has played down the importance of numeracy except for those specialising in science and mathematics but who were, indeed are, apt to be regarded as mere technicians. So we have had our administrators and political leaders, persons of high ability and learning but frequently almost completely innumerate. Associated with this innumeracy has been an ignorance of modern physical science though not necessarily of biology, for a knowledge of some aspect of descriptive natural history is not regarded as out-of-place among gentlemen.

The Dissenting Academies preceded the general rise in education to which I have referred, but they became superfluous as the sharp divisions between conformist and non-conformist softened, and the example they offered of the rounded syllabus, with science and mathematics compulsorily included was but short lived, although the reform of advanced teaching in English rather than Latin became general. The dissenting ministers of the 19th century, and even more so in the 20th century, had their education firmly grounded in the classics, classics meaning the literature of the classical age.

Whatever their background training, persons of ability use that ability in the furtherance of their intellectual interests but, with rare exception, they will do so with the aid of the tools acquired in their early training. So it comes about that literary judgments are made with the aid of wide experience in handling words; a feeling for their order and rightness in a given situation. Maybe this is all we can have when we discuss questions of taste or quality: whether Mrs Gaskell writes a clearer and better English than Charles Dickens or we discuss with the Leavises the ‘moral’ value of ‘good’ writing compared with ‘bad’ writing.

However there are quite other problems associated with literary texts, particularly, though not exclusively, with ancient ones. Maybe these problems are not of the importance they would have been to our forebears. The early Puritans assumed the Pauline signature on 1 Corinthians, 2 Thessalonians and the reference to the large letters written with his own hand at the end of Galatians and Colossians to have been authentic and they were content therewith. Paul is scarcely our patron saint and we can approach his alleged letters with a more dispassionate eye, but we do still have a strong interest because his was the scion grafted to the primitive sect whereby it grew to modern Christianity, including us, instead of possibly remaining a sect of Judaism.

Questions of authorship ought, if possible, to be settled by objective rather than subjective means and this is where modern stylometry based on statistical methods has obtruded into the field of the classicist and the theologian.

Why should these studies be of interest to Unitarians as Unitarians? We have long outgrown the situation of being the 'people of a book and that book the Bible'. It is true that the more conservative among our numbers, still in their unguarded moments, quote the sayings of Jesus from the Gospels as if they were in verity accurately reported speech. Most of our Churches still use principally the Bible and usually the New Testament for readings during religious services. But this use of the New Testament is insufficient to explain interest in the modern form of textual criticism. Perhaps we shall be in a better position to answer this question when rounding off this lecture rather than now, at its beginning.

Let us assume an interest in authorship and also a certain dissatisfaction with traditional uses of internal evidence concerning it and turn our attention to these modern methods. Before I do so, a few personal words may not be considered out of place. My own interest in the subject was awakened by the chance concatenation of an interest in the history of science, in particular the early history of the Greek period and some appreciation of modern statistics derived from working with colleagues knowledgeable in the field. What little original work I have done on my own was largely done before pocket calculators were available, let alone computers. Indeed, a friend sent me a cutting from the *Scientific American*<sup>2</sup> which made a statement to the effect that I was associated with pioneering work in the field in '1951 B.C.' (before computers)! The reviewer seemed to think that any work done without the aid of computers implied superhuman calculating powers. I assure you it is not so. In those early days, if I may continue my personal remarks, I needed a Greek Text for experiments with numbers. The earliest Mss of Aristotle, or of the medical writers, actually date from the 10th century AD and I felt I needed something that was not so far removed from the autograph copy; something that had not been subjected to a chain of copyists, good, bad and positively perverse. Roger Thomas, a classicist, scholar and friend was at hand for advice. Quite apart from the help of his scholarship which was as imaginative as it was deep, it is opportune in an audience who knew him to pay respect to the memory of someone who so profoundly influ-

enced me. Hence I used the Pauline Epistles as my model to validate the methods hitherto used on agricultural yields and laboratory experiments. Through a biologist - statistician, the late C. B. Williams, FRS., I was introduced to the Rev. Andrew Q. Morton with whom, over the last 25 years, I have done some work whilst he has really made the subject his own with a long series of books and papers. As an Honorary Fellow in the Department of Computer Science at Edinburgh University, in addition to running his parish, he has access to large computing power so that my own more recent work, little though it is, has been done collaboratively with him and has used computer technology even though I have never learned the art, now taught to 11 year olds, of writing a computer program.\* Do not feel that you will be unable to follow or understand this lecture if you too cannot write a computer program or have not succumbed to the advertisements for computers now available at less than £50 (assuming possession of a TV to which to connect it).

### The type of Questions that can be asked and answered

Before describing methods and the results obtained by applying those methods it is necessary to consider what sorts of inference can be drawn from the results. Typically, statisticians express their results, when they are being technically precise, in the form of a null hypothesis. We may state not that two distributions of some property such as sentence-length or distances between the occurrences of some given work are identical, they rarely are, but that we have no grounds for believing them to be derived from different populations. The reason for this circumlocution is that the null hypothesis can be tested mathematically and we can show that it is true 19 times in 20 or 99 times in 100 as may be. More importantly, when differences do exist, we are in a position to show that differences, which could occur by chance, would only do so once in 20 times or 100 times. This being so, we then consider that 1 in 20 or 1 in 100 is unlikely or extremely unlikely. But, it must be remembered, that the size of the odds we accept (to use a betting term) against the truth of the null hypothesis is quite arbitrary and some people will want to choose differently from others. What we can state with certainty is that the longer the odds, the more improbable the truth of the null hypothesis.

The next thing to be emphasized is that the evidence offered by a statistical method has to be weighed with other evidence obtained perhaps by another statistical or by a more traditional method. The numeric basis of the statistical methods makes the weighing a more precise and less emotional business, but it must not be assumed that where a conflict of evidence exists, the numeric is always superior. The statistical evidence can be no better than the original data re-expressed as numbers. The American computer man's adage 'Garbage in; garbage out', expresses a truism. An indifferent manuscript or the choice of one Ms tradition

\* It is the spelling convention when embarking on a programme of computer work to write a *program* for the computer.

rather than another; the use of unsuitable non-discriminating marker words or features, can mislead the uncritical.

What types of problem can be helped by the methods I am about to describe?

(i) The match problem. Are two works likely or unlikely to be from the same author?

(ii) Does a text exhibit a change at a given place which would be consonant with a change of author?

(iii) Can interpolations be identified?

(iv) How are mistakes likely to accumulate in a Ms tradition?

There are other questions which could be, and have been, subjected to stylometric scrutiny, but these will suffice for our illustrations.

### The Nature of the Methods Available

If we are dealing with modern English prose writings it would, in general, be possible to take samples of a reasonable fixed length and compare them for a number of features. We might count the nouns, or the verbs in the sample. We might count the particles or other ancillary words such as adjectives or prepositions or perhaps the ratio of adjectives to nouns. We might count the number of words per sentence or the number of words between two successive occurrences of a noun - any noun, or a particle or some other frequently occurring word. Provided we were comparing writings of exactly the same length it would be possible to do any or all of these things. We would find that some of these measures discriminated well between authors and that some either showed no variation at all or else varied within the known works of one author as much as between the works of different authors.

The range of possible measurements I mentioned contained in one parcel a number of very different kinds of number. If we count the number of occurrences of the conjunction 'and' in passages not of the same length we would find the number varied directly as the length of the passage. If we counted the number of nouns which occurred once only in passages of varying length we would find that this proportionality had disappeared. The way the number of features, such as once occurring nouns, varies with the length of a work, is complicated. The proportion of sentences of various lengths remains unchanged provided reasonably long passages are considered. If authors used their sentences at random, we would not need to worry about the lengths of the passage to be compared. But authors do not do this. They emphasize their arguments by a run of short, staccato-like sentences, slowing down to longer sentences for more involved reasoning or description. Such features of style behave as if they were random only in samples of prose greater than a length sufficient to encompass these changes several times over. Some authors so group their short sentences and longer sentences that it is actually possible to measure this tendency by calculating the correlation between the length of a sentence and the one that follows it.

About the earliest method tried in problems of authorship was that

of counting the average length in letters of the words used. This is not very discriminating and the earliest successful method applied to Greek texts was undoubtedly by an examination of sentence-length.

At the risk of being criticized for taking too elementary an approach I will set out exactly what one does with the sentence lengths when they have been counted, nowadays by feeding the text into a computer and having the lengths printed out as the computer scans the text. Instead of dealing with individual lengths one groups the lengths in 5's. Thus in Table I which compares Romans, Galatians and Colossians, all sentences having lengths of 1 to 5 words are counted as being 3 words long. There are 78 such sentences in the text of Romans used and 21 in Galatians. Similarly with the longer sentences.

TABLE I. Sentence-length Distributions of Romans, Galatians and Colossians<sup>1</sup>

No of words in Sentence	Romans	Galatians	Colossians
1-5	78	21	5
6-10	160	54	14
11-15	101	46	10
16-20	52	24	7
21-25	51	7	6
26-30	14	5	8
31-35	12	2	2
36-40	7	1	2
41-45	9	3	1
46-50	8	1	1
51-55	2	1	—
56-60	3	—	1
61-65	—	—	1
66-70	—	—	1
71-75	—	1	—
76-80	—	—	2
81-85	1	—	—
86-90	—	—	1
Totals	498	166	66

These series of numbers we call a distribution and we can represent them diagrammatically either by a bar chart or graphically by a smoothed curve. If either of these forms of representation is used it will be noticed that the diagrams are not symmetrical; most of the sentences are very short, six words or less, but there are a few tailing off to just the odd one or two sentences of, say, 70 words or more. We call these distributions skew and this particular type of skew distribution can be changed into a symmetrical one with most of the sentences grouped in the middle and more or less equal numbers of shorter and longer sentences on either side, if, instead of working with sentence lengths as numbers, we used the logarithm of those numbers. How can we compare distributions of 498 sentences with 166 and 66? We calculate certain constants of those distributions. The simple arithmetical mean or average will be familiar to you all. Possibly also the median which is the length of sentence with 50% shorter and 50% longer; the mid point of the distribution. The first quartile is the length below which 25% of the sentences lie and the ninth decile is the length above



which are only 10%. The first quartile measures, as it were, the shorter sentences, the ninth decile, the longer sentences. Table 2 gives these constants for the distributions shown in Table 1.

TABLE 2. Constants Derived from the Distributions of Table 1.

Constant	Romans	Epistle Galatians	Colossians
Mean	14.3	13.8	24.0
Median	10.6	10.9	17.9
1st quartile (measuring shorter sentences)	6.4	6.9	9.1
9th decile (measuring long sentences)	27.2	23.1	50.0

There now exists much data from a very wide range of Greek and English authors showing that when they are writing in a standard prose form they do not change the constants of their particular sentences length distribution by more than an amount which we call sampling error, which varies from author to author and inversely with the length of the sample. We can calculate this variation. The figures do not prove that Paul wrote Romans and Galatians, they only demonstrate that the distributions are indistinguishable and therefore we have no reason to believe that they were not from the same hand. We have every reason to believe that the sentences of Colossians come from a different hand in spite of the similarity of claim with which Galatians and Colossians both end. The average sentence from Colossians is almost twice the length of those in Romans and Galatians and whereas 90% of the Romans' sentences are shorter than 27 words, we have to move up to 50 words before we can say the same of Colossians.

One of the classical methods used in studying authorship is that of counting the occurrences of given words. Traditionally, these have been unusual words occurring rarely. The extreme of this is the citing of *hapax legomena*. The statistical approach is the very opposite. It is the study of the occurrences of the insignificant words which are used very frequently and whose pattern of occurrences can therefore be studied. In Greek, words such as *kai*, *de*, *en*, *estin* (in its various conjugations) are used extremely frequently. Morton<sup>4</sup> has shown that not only is the frequency of occurrences apparently characteristic of an author, but the distribution of the word in the sentences and indeed even the position of the word in the sentence. We can, of course, also side-step arguments about punctuation of the autograph text by counting, not the occurrences of, for example, *kai* in sentences but the number of words between successive occurrences of the word and thus form a distribution in the way we formed the sentence length distribution. Some idea of the importance of these words to the text can be gained by looking at the Pastoral Epistles taken as a whole. In a standard text<sup>5</sup> there are 2604 words made up from a vocabulary of 624 words. *Kai* occurs 159 times; *ho*, 102 times; *en*, 91 times; *estin* and *oti*, 79 times; *de*, 11 times.<sup>6</sup> These 6 words account for 20% of the text. From the statistician's point of view there must be a lot of information to be gleaned from 20% of the text, although from a theologian's or historian's classical viewpoint, absolutely nothing.

### Information from *kai*

One study<sup>7</sup> looked into the homogeneity of Romans. The text was divided by an independent New Testament scholar (the late Prof. G.H.C. MacGregor) into four sections, three of 150 sentences and the fourth of 65, as Chapter 16 was omitted since its exclusion from the Chester Beatty Ms apparently weighed heavily with MacGregor although Chapter 15 is also missing from some good sources and Origen knew that Marcion preferred a text without either 15 or 16. Table 3 shows how *kai* is distributed in sentences in each of these four samples.

TABLE 3. The sentence-distribution of *kai* in samples from Romans

No. of occurrences of <i>kai</i> in sentence	Number of Sentences in-			
	Sample 1	Sample 2	Sample 3	Sample 4
0	98	113	111	33
1	34	30	32	24
2	15	4	4	5
3	0	0	2	3
4	3	2	1	—
5	—	1	—	—
Total no of sentences	150	150	150	65
Mean occurrences per sentences	0.506	0.340	0.330	0.662
Standard error of mean	±0.058	±0.048	±0.047	±0.101

These distributions are of a type known as Poisson distributions and we can estimate the standard error of the mean (provided that the total number of occurrences of *kai* can be regarded as 'large') in order to decide whether or not the 4 mean occurrences could be derived from the same population by chance selection. This and other tests of significance show that sample 4 undoubtedly differs from the others although if we omit Chapter 15 as well as 16 from the sample, as Marcion did, we alter the distribution so that the mean no longer differs from the others. Similarly, the somewhat high value of sample 1 seems entirely due to an excess occurrence of *kai* in the first chapter.

TABLE 4. Frequency of occurrences of *kai*.

Epistle	Sample	Frequency of occurrences of <i>kai</i>
Romans	1.	25.3 ±2.3
	2.	35.8 ±5.0
	3.	30.4 ±4.1
	4.	19.9 ±3.3
Galatians		31.3 ±4.0
Colossians		15.9 ±1.2

But this does not yet exhaust the information to be obtained from *kai*. Sentences can use *kai* as a simple conjunction, the main use in the Pauline corpus, or it can have other use with translated meanings other than 'and' as, for example, when it is used as the first word of a sentence. If we look at

its simple use as a conjunction we can find the apparent mean length of the phrases it joins together by taking the mean lengths of the sentences in which it occurs, once, twice, etc. and dividing by the number of occurrences plus one.

TABLE 5. *Estimated Clause Length with Conjunction kai*

Epistle Samples from	Sentence or clause length for no. of kai			
	0	1	2	3 and more occurrences of kai
Romans	8.4	7.7	10.0	6.0
	9.6	9.5	6.8	6.4
	8.9	6.85	4.4	4.9
	9.6	8.35	5.8	4.5
Galatians	9.9	8.1	9.4	7.0
Colossians	11.3	8.65	7.4	9.0
Mean	9.6	8.2	7.1	6.3

These figures will give a rough idea of how sentences are built; rough, because no allowance is made for those occurrences of *kai* which are not conjunctive or join words rather than clauses. The average sentence without the presence of *kai* is about 10 words long and is extended by a further period of 6 to 8 words each time *kai* is used. It is this simple construction which leads to a very strong correlation between the occurrences of *kai* measured in words and the mean linear sentence length. (This is not always true if a logarithmic scale of sentence length is adopted<sup>1</sup>.)

### Positional Stylometry

If a word can occupy any position in a sentence then its mean position in the sentence of a work in which it occurs a reasonable number of times will be at the mid-point of the sentence. In other words if we count forwards from the first word of the sentence and backwards from the last word, two distributions will be obtained the means of which will be equal except for a sampling variation depending on how many sentences there are in the sample. It is a convention, when examining position, to ignore sentences in which the word does not occur but to count twice sentences in which the word occurs twice. This leads to a convenient index approximating to the mean word position in the sentence, although where there is more than one occurrence, the figure quoted will be enhanced if it is the longer sentences that contain the duplicates, or reduced if the very short sentences.

A particle such as 'de' is highly positional. It occurs nearly always as the second word of sentences if it occurs at all. A forward count will have a mean of about 2 whereas a backward count will have a mean approximating to one less than the mean of the sentence length distribution. Morton suggested looking at the distributions and identifying mobile words giving rise to isotropic distributions and other words fixed to a greater or lesser extent. An example studied by Morton and a colleague<sup>2</sup> at Edinburgh University can be taken from the Pauline Epistles. *Christos*, strictly in grammatical terms an adjectival verb masquerading as a noun, is a highly mobile word and its mean position whether forwards or backwards approximates to the mean length of the sentence in which it occurs. This

differs, of course, from the mean of all sentences as can be seen from Table 6.

TABLE 6. *The Occurrence of 'Christos' in Sentences*

	1st Corinthians	Galatians	Ephesians
Mean length of all sentences	12.1	13.3	24.3
Number of occurrences of 'Christos'	58	38	46
Mean length of sentences containing 'Christos' (equals mean position in sentence)	20.6	19.5	31.15

Obviously, the writer(s) of these epistles tend(s) to put *Christos* into long sentences. In the case of Ephesians, the length is increased by the duplicate occurrences in a number of sentences. There is clear discrimination in the way *Christos* is used in Ephesians to its use in the other two Epistles yet the total number of occurrences lies midway between the other two.

### The Theory of Copying Mss and Identifying the Provenances of Scraps of Ms.

The study known as Statistics is based on the theory of probability which, historically, owes its origin to speculations about what happens in games of chance, games thoroughly condemned by our Puritan forebears. However, Spinoza wrote a little known work '*Reeckening van Kanssen*' and the mathematical approach to games of chance was first formulated by Pascal also better known for rather austere philosophical-cum-theological writings.

Probability theory was applied by Yule<sup>3</sup> to the errors that occur in copying Mss.

To study the matter theoretically he constructed a model. He showed with experiments based on tables of random numbers to simulate the chance process what would be the behaviour expected of copyists given the simplifications and assumptions incorporated in the model. Nowadays, of course, a computer simulation would be run.

It was assumed that a manuscript was copied accurately and straightforwardly except at certain vulnerable or critical places. At these places errors occur in the form of misreadings, e.g., portions left out due to the eye taking in two occurrences of the same word and skipping from one to the other (haplography), or a repetition of a phrase already copied (dittography). Both these latter mistakes are more likely when identical words, perhaps more than one, occur immediately beneath one another or at the beginning of lines separated by only one or two lines from each other. It was further assumed that once a mistake had been made it could not be corrected by any chance process and that the Ms in the region of the error was, thereafter, stable. A last assumption was that the chances of an error at any of the vulnerable spots were identical and always the same. This, obviously, is a simplification of the true process introduced to make the mathematics easier. Yule was interested in an argument about whether cis- or transalpine readings of Mss in *De Imitatione Christi* were likely to be more primitive. Book II contains 118 variants; Book III, 208; and Book IV, 37. These figures show the magnitude of the problem.

Let us suppose that the chances of an error at the vulnerable spots is 50:50; that the text contained 100 such places and that the copyist made

100 copies from this text. We would expect on average 50 mistakes in each copy, but, owing to the nature of the chance process, the distribution to which it gives rise is a binomial distribution and the experiment that Yule carried out turned up 39 mistakes in each of 3 copies and as high as 60 mistakes in one copy. It might be said that no copyist would be so careless as to make 50% mistakes over a total of 100 critical places so we scale down to only a 10% chance of making a mistake; i.e. a 90% chance of getting it right. On average, therefore, with the same manuscript, there would be 10% mistakes in copies made from the master copy. But, a more realistic process involves families of copies being made not all from a master but descending, as it were from master to son, son to grandson. If the first copy contained 10% mistakes on average, as the copies succeeded each other the mistakes would increase in the way shown in Table 7 for this model manuscript with 100 critical locations where mistakes may occur.

TABLE 7. *The Accumulation of Errors in Serial Copying of Mss.*  
Copy Number Expected Mean % of Errors

1	10
2	19
3	27.1
4	34.4
5	41.0
10	65.1

If we look at the number of variant readings in the books of *De Imitatione*, remembering that every variant represents an error in one or other of the Mss families, and that it would be unusual for families of copies to be more than a few generations long, it must be concluded that copyists approached more nearly the case of even chances of error than they did the standard of accuracy represented by the 10% chance of error. There are, admittedly, simplifying assumptions in the statistical model proposed by Yule but something very much like it is required to account for the number of variants found in Mss. This problem is that of identifying the errant readings in a completed text. The reverse problem, that of having a few letters only, and identifying the source, is not so much a probability problem, though it can become so, as a search problem in which the computer can take over from the scholar, performing in seconds what, but for a flash of inspiration, could take months. The possibility of using a computer was demonstrated in the Department of Computer Science in Edinburgh<sup>10</sup> by an experiment with the Dead Sea Scrolls. The first few letters of five lines were transcribed from a passage that had been identified as from the Septuagint version of Leviticus 26.v.16. The computer was programmed to match the letters recorded provided that they were in lines not less than 7 or more than 55 letters, the identified letters being immediately beneath each other. Genesis, Exodus, Leviticus and Deuteronomy were searched and only one location was selected; the correct one. The letters transcribed were gradually reduced until only *ta*, *kai*, and *(ps)or* (three letters) remained. The computer still found no matches in Exodus or Deuteronomy and only the correct one in Leviticus.

As a matter of interest, a text<sup>9</sup> of the Gospels was searched but no identification was made.

Attention was then turned to the unidentified fragment from Qumran known as 7 Q 5. This consists of *-to-kait-ne*. This is said by O'Callaghan<sup>11</sup> to prove that a copy of the Gospel of Mark was available about 50 AD. The same computer program used for the validating experiment above was run on the Septuagint and it located 64 possible sites in Genesis, 58 in Exodus, 28 in Leviticus and 55 in Deuteronomy. The Levitical sites are recorded in the paper<sup>10</sup> together with the statement to point out that the probability the fragment is an early copy of Mark is not as high as the probability that it comes from the Septuagint Pentateuch! Provided suitable computer-readable texts are available fragment location becomes a relatively mechanical affair. More importantly, the subjective bias to accept the first location found is checked by the knowledge of other, equally probable locations. Judgment is, of course, still required in choosing which texts to search. In fact, search for 7 Q 5 in classical authors yields a host of locations but no one imagines a classical library being stored by religious fanatics at Qumran.

### The Pauline Epistles

Let us leave the computing details of the Pauline Epistles for the figures, distributions and arguments have been published in a number of places and most are conveniently summarised by Morton and McLeman.<sup>12</sup> We now try to assess the principal conclusions.

There are two problems relating to works like the Pauline Epistles which differ from those associated with the Gospels. There is the problem of gross disorder and that of why beginnings and endings are tampered with. The Gospel problems are in one sense easier to understand. We know the demands of the times led to the solution of conflation. Two, or perhaps three documents were sources from which a single work was to be produced, bound by the framework of a story already well known in its main facts and outline. That these conflations were rather crudely done in the sense that blocks from one source were interspersed with blocks from another source undoubtedly arose from the sheer mechanics of the process, the use of professional copyists and the need to use papyrus economically. The ancient equivalent of VAT was probably high! It appears highly probable that the Codex, the collection of folded sheets of papyrus bound together, was an invention brought about by the needs of the Christian communities. A book shortly to be published by two distinguished papyrologists<sup>13</sup> promises to elucidate this with new evidence. Morton has argued in several places that the size of the Codex sheet employed determined the proportional reckoning for the conflation. Professional scribes wrote extremely uniformly and the number of letters per column remained fixed within narrow limits. Two or three columns per page were used because rolls had always, necessarily, been written in columns and the pattern was carried over to the papyrus sheet although, of course, there was no reason why writing should not extend right across



the page. It was the column which tended to form the block of the new conflation and proportionality calculations were necessary if sources were of different sizes and different again to the size of the virgin sheet lying in front of the editor or copyist. The detailed working out of this situation has been attempted by Morton and McLeman in the case of John's Gospel.<sup>14</sup> As will be seen from the following summary, these arguments are difficult to apply to the Pauline Epistles.

Romans seems to have had its first and last two chapters either substantially edited or, more likely, added to, in whole or in part, by another hand. Apart from this, the bulk of Romans cannot be distinguished from Galatians or I Corinthians. Internal evidence strongly suggests that the writer wrote at least four letters to the Corinthians<sup>15</sup>, an early letter or letters of which no trace remains. I Corinthians, a 'Severe Letter' of which II Corinthians 10-13 is a fragment and lastly a letter from which II Corinthians 2-9 has survived. The statistical constants of the 'Severe Letter' are uniform with I Corinthians, Galatians and the bulk of Romans (i.e. Romans less Chapters 1, 15 and 16).

Statistically, II Corinthians 1-9 differs from the remainder of the Epistle and the difference has been traced, by means of a technique known as *Cu-jum* analysis, to a discontinuity around Chapter 1. If this chapter is removed II Corinthians 2-9 appears uniform in statistically measured attributes of style with Romans (less beginning and end), Galatians, I Corinthians and II Corinthians 10-13. We should be perverse not to regard this core of the writings as the work of Paul and equally perverse to regard the very different Ephesians, Philippians and Colossians together with the Pastorals as by the same hand. Thessalonians I and II are really too short for confident acceptance or rejection but the development of the subject may introduce further statistical tests that will be more sensitive or discriminating. If so, it might become possible to show that the discontinuity which can be demonstrated by *Cu-jum* at the end of Hebrews enables its final chapter to be a candidate for Pauline authorship.

These findings are not so very different from the derided statements of the German school, or of Schweitzer. They have, however, been removed from assessments of subjective features to those which anyone who can count can verify. To assist that counting and calculation, in addition to the books and papers I have already quoted, I would draw your attention to the latest text book on the subject by the Master of Balliol<sup>16</sup>, 'The *Computation of Style*' described in its sub-title as 'An Introduction to Statistics for Students of Literature and the Humanities'. As I wrote in a review<sup>17</sup>, 'No theologian writing on Paul should be ignorant of textual evidence examined by the simple technique here described'.

### Beginnings and Endings

The second problem is one of faulty beginnings and endings. It is difficult for us to accept that people other than rogues or the mentally disturbed would deliberately misuse the authority of an important person by attaching his name to their writings, the opposite of plagiarism, the sin

of more recent times. Pious frauds have, however, been a feature of religious life down the ages. Signatures and internal remarks of a nature as to imply authenticity are, in fact, of no value and must frequently, for other reasons, be disregarded. An example, not taken from the beginning or end of a text concerns II Corinthians 3, v1. There is evidence<sup>18</sup> for an anomaly somewhere between 2, v15 and 4, v13. The New English Bible translation asks, 'Are we beginning all over again to produce our credentials? Do we, like some people, need letters of introduction to you, or from you?' The answer to this rhetorical question must be, 'Yes, I am afraid you do'. This phrasing is typical of special pleading for authorship found in cases where authorship is doubtful.

Martineau discusses this phenomenon at some length<sup>19</sup>, pointing out that 'If direct and rigorous proof were required it would be impossible ever to trace a book on our shelves today to the hand of a specified man in Athens, or Rome, or Jerusalem'. He goes on to cite cases of mistaken attribution which have persisted long after the true author has been identified. A particularly interesting case he quotes is the *Eikón Basiliké*, originally said to be written by Charles I, but which, after the restoration, was identified by his own confession as the work of Bishop Gauden of Exeter. The loyal followers of the 'martyr Charles' could not and would not believe Gauden. Martineau continues that 'when, in 1699, Totland, in his *'Life of Milton'* reproduced and corroborated the poet's critical judgment [about the *Eikón* published before the denouncement-W.C.W.] he added, not without reason, this reflection: that if forty years of modern daylight, when criticism is awake and keen, and conflicting parties in the state are intently watching one another, suffice for the establishment of such a fictitious claim, it cannot surprise us, that, in early Christian times, many spurious productions found their way into circulation under the names of Christ and his apostles'. A reply in the House of Commons defended, said Martineau, 'in the same breath as alike authentic, the Christian Scriptures and the *Eikón*.....'. Even in recent times Dr. Whitehorn<sup>20</sup> seemed unaware of the true nature of the *Eikón*. However, until proven otherwise, there is always a strong case to be made for accepting traditional attributions, as we have done for the Romans, Galatians, Corinthians core of works. The use of the name Paul at the beginning of Ephesians, Philippians and at the beginning and end of Colossians is not to be weighed against the proofs that different hands are involved.

### Conclusions

Why are we concerned, as Unitarians, for this particular way of arriving at these conclusions? I promise to try to answer this question, conscious that my answer may be inadequate or even wrong; indeed I have a strong feeling that I do not really know the answer. However, if I must, my answer would be to the effect that Unitarianism, the rational dissent from dogmatic Christianity, still needs to feel strong connections with the roots from which it grew. Instinctively, we cannot just accept those roots; too many strange scions have been grafted to them; we are too accustomed to

using our critical faculties on the world around us not to use them here. We therefore find understanding of our predicament in a study of the past, preferring, as we have always done, objective criteria to vague emotionalism. These new methods are the very epitome of objectivity. Commenting on the stir which these methods have caused in some quarters the Rev. J. McLeman wrote in a News Sheet published by the Church of Scotland,<sup>21</sup> '.....if there is a revival of interest in the historical approach to the N.T. three cheers! A new stimulus to the thinking of the Church can do nothing but good. Whether it can fill the pews is another question'.

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